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AUTHOR Olsen, Scott A.
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ABSTRACT

When a program evaluation is conducted on the basis of gains made in standardized achievement test scores between a pretest and a posttest, serious bias can result where a floor effect exists on one or both of the test levels. Based upon the expanded standard scores on the Comprehensive Tests of Basic Skills from three successive regular spring test administrations and a special mid-period out-of-level test administration, this study examined score distributions for schools in a large city school system to determine if their compensatory program evaluations were biased by a floor effect. The distributions were examined for changes in location, variation, and skewness as students moved across time, taking different levels of the test at different times. The pattern of distributional characteristics for both reading and mathematics over the four testing periods indicated that a floor effect was quite unlikely to bias group comparisons in the upper elementary grades under study (grades 5 and 6). (Author/CP)

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# IOWA TESTING PROGRAMS OCCASIONAL PAPERS

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## AN INVESTIGATION OF POSSIBLE TEST FLOOR EFFECTS BY COMPARING SCORE DISTRIBUTIONS FOR STUDENTS TESTED WITH TWO DIFFERENT LEVELS OF A TEST BATTERY AT FOUR DIFFERENT TIMES OVER A TWO-YEAR INTERVAL

SCOTT A. OLSEN

IOWA TESTING PROGRAMS

UNIVERSITY OF IOWA

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## ABSTRACT

When a program evaluation is conducted on the basis of gains made in standardized achievement test scores between a pretest and a post-test serious bias can result where a floor effect exists on one or both of the test levels. Based upon the expanded standard scores on the Comprehensive Tests of Basic Skills from three successive regular spring test administrations and a special mid-period out-of-level test administration, this study examined the pattern of distributional characteristics for schools selected as representitive of compensatory programs in a large city school system to determine the extent to which a floor effect might exist to bias their compensatory program evaluations. The pattern of distributional characteristics for both reading and mathematics over the four testing periods indicates that a floor effect is quite unlikely to bias group comparisons in the upper elementary grades under study.

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In tests of ability or achievement, the term "floor effect" is used to denote a condition under which the actual ability or achievement level of a pupil is below the lower limit of the range of ability or achievement measured by the test. In such a situation, the pupil of low ability may be expected to score at least as high as the lower limit of the test simply by responding at random to questions and so obtaining some right answers, to yield a scaled score that would be higher than the scaled score he would be expected to make if the test were to have a "lower floor." An evaluation based on gains made between pretest and posttest can therefore be seriously biased in one of three ways depending on the pattern of testing. First, consider the case where the pretest has a floor effect and the posttest does not. This might occur where the same level of the test is administered both times. In such a case an individual could actually make sizeable gains, yet, due to the fact that the pretest score was greater than the actual initial achievement level, the observed gain would be smaller than the actual gain. This is perhaps the most common result of floor effect. Secondly, consider the case in which the pretest has no floor effect but the posttest does, a case that could arise if pretesting were carried out with a lower level test and posttesting with a higher level test. In such a case, if the pupil's achievement has not yet reached the lower limit of the posttest measure, he could show a greater score gain than actual gain. Lastly, and by far the most rare, there is the case in which both pretest and posttest have a floor effect. Here little more than chance gains (or losses) could be expected.

Thus where a floor effect does exist an evaluation based on gains can make some schools look better or worse than they really are relative to the rest of the school district (or other norm) depending upon the test levels administered. Floor effects of this kind are particularly troublesome when evaluating programs that are compensatory in nature (see Campbell and Boruch, 1975), since the individuals in such programs tend to have scores in the lower portions of the score distribution for a school system.

The most common remedy for a test floor effect is to test "out-of-level". The phrase "out-of-level" simply refers to situations in which a student (or group of students) is administered a test primarily designed for a grade level that is different from the grade level the student is actually in. That is, the student is tested using a test more appropriate for his functional achievement level than the test usually administered to a student in his school grade. In dealing with a floor effect this means testing with a lower level test. Of course to test "out-of-level" requires that the test to be used has a reporting score scale that is equivalent across the different levels. The CTBS expanded standard scores (ESS) is such a scale and should result in equivalent scores regardless of the form and/or level provided no floor effect (or ceiling effect) exists.

The possibility that floor effects might exist to yield biased estimates of program impact recently arose in connection with the evaluation of PLAN* (Programmed Learning in Accordance with Needs) in selected schools in a large city school system. Specifically, the question of interest was: Would it be more appropriate to test the upper elementary

classes in the lower scoring schools "out-of-level?" That is, is there a floor effect in these schools which would affect the evaluation results?

To answer this question schools were first denoted as belonging to one of three building treatment group categories (BTGC) as follows:

BTGC = 0 for schools that did not have a Title I funded compensatory program

BTGC = 1 for schools which had a Title I funded program other than PLAN*

BTGC = 2 for schools which had PLAN* as their compensatory program

Three or four numerically ordered schools (NOSCH) were then selected as representative of each of these categories. In late October of 1977 (77.8) the 5th and 6th grade students in these schools were administered the level 1 CTBS, which for both grades was an "out-of-level" test. Since, as part of the regular testing program, these schools are tested "in level" during March of each year, test scores were available for the 1976, 1977 and 1978 spring testings (76.3, 77.3 and 78.3 respectively). Therefore thinking in terms of a school's calender year being made up of ten parts, five winter-spring months (Jan.-May) a summer part (June-Aug.), and four fall-winter months (Sept.-Dec.), the special out-of-level test administration in October of 1977 (77.8) nicely falls about half way between the 77.3 and 78.3 testing periods. The forms and levels of the CTBS administered at the four time points are given in Appendix I.A.

In this study the term "cohort" is used to represent a class grade

group as they move through time. Specifically, two cohorts are defined as follows:

Cohort = 3 for those students who were in grade 3 in March 1976, in grade 4 in March 1977, and in grade 5 in March 1978;

Cohort = 4 for those students who were in grade 4 in March 1976, in grade 5 in March 1977, and in grade 6 in March 1978.

Note the cohort a treatment group (BTGC) is in corresponds to the grade that group was in during the 1976.3 test administration. Also recognize that there are three different treatment groups in each cohort, a total of six different groupings of students. Appendix I.B, gives a cross referencing table of schools (NOSCH) within group (BTGC) within cohort.

Students with valid total reading expanded standard scores (TRE) and valid total mathematics expanded standard scores (TME) for each of the four testing periods were used as the basis for this study. A total reading score (TRE), on the CTBS is a composite derived from two reading subtests, Reading Vocabulary and Reading Comprehension. Similarly a mathematics score (TME) is a composite derived from three mathematics subtests, Mathematics Computation, Mathematics Concepts and Mathematics Applications. For the purposes of this study only the TRE and TME scores will be used for making comparisons. However, for information, distributional statistics for all subtests have been summarized in Appendix II.A,

for each treatment group (BTGC) in each cohort. A similar summary of distributional statistics for each school (NOSCH) in each cohort is given in Appendix III.A.

Within each cohort the test score distributions corresponding to each of the four testing periods were compared for each treatment group. In examining these distributions one is interested in any changes in location, variation, and skewness that occur as the group of students move across time taking different levels of the test at different times.

Probably the single most important distribution characteristic to consider is the location. In considering the location of the distribution one usually refers to a point around which the distribution is approximately centered (i.e. a measure of central tendency). The mean (arithmetic average) is quite commonly used for this purpose, and it is given in Appendix II.A. for each treatment group and in Appendix III.A. for each of the individual schools. However, as shall soon be seen, the distributions under consideration are generally skewed (non-symmetric), in which case the median (50th percentile) is a better location parameter to use. The median is also less influenced by outliers (observations that are extremely distant from the center of the distribution), and as one might suspect, looking at the minimum and maximum values reported in Appendix II.A and III.A, there are in fact outliers in the distributions as shall be made clear shortly. The median as well as other selected percentiles for the reading and the mathematics score distributions are presented in Appendix II.B. for each treatment group, within each cohort, and Appendix III.B. for each school within each cohort.

The way the scores in a distribution are spread out is quite commonly represented by the standard deviation. Standard deviations for both reading and mathematics scores are reported in Appendix II.A and III.A for treatment groups and for schools respectively. A good idea of the variation can also be gained by looking at the difference between the 25th percentile and the 75th percentile, which is known as the interquartile range.

The skewness of a distribution refers to its lack of symmetry. In Appendix II.A. and III.A. the skewness parameter will be zero when the distribution is symmetric (i.e. not skewed), positive when the distribution has a long tail at the upper end of the distribution and negative when the distribution has a long tail at the lower end of the distribution. The skewness of a distribution may also be examined in Appendix II.B. and III.B. by determining whether the median is nearer to the 25th or the 75th percentiles. The long tail is in the direction of the greater difference.

In looking at simultaneous changes in the above described independent distribution characteristics of location, variation and skewness as the distributions correspond to different test levels and different dates, one should be able to recognize patterns which are expected under the hypothesis that a floor effect exists or under the alternative hypothesis that a floor effect does not exist. More specifically under the hypothesis of a floor effect, one would expect the median to show a substantially smaller increase from year to year than the norm where a group is tested with the same level test, and a fairly sharp increase where the group

changes to a higher level test, with a pronounced decrease in growth being apparent where the group changes to a lower out-of-level test. Furthermore, under the hypothesis of a floor effect one would expect the variation in the out-of-level test scores to be greater than or equal to the variation in test scores of a test given at a higher level for the first time. That is, in cohort 3 one would expect the variation at time 1977.8 to be greater than the variation at the other three time points and in cohort 4 one would expect the variation at time points 1976.3 and 1977.8 to be greater than or equal to the variation at time point 1977.3 where students were tested at level 2 for the first time. The rationale behind these variation expectations under the floor effect hypothesis is that students scoring on the floor of a test cannot vary very much, but if allowed to score at their functional levels they must spread out. Finally, under the hypothesis of a floor effect one would expect the skewness of the distribution at time point 1977.8, at which the out-of-level test was administered, to be nearest to zero, with the greatest positive skew occurring where the level 2 test was administered for the first time since this is where scores are most likely to be bunched up at the bottom of the scoring range.

Now consider what one would expect under the alternative hypothesis of no floor effect. Under this hypothesis one would expect the median to show a steady growth pattern from year to year. Similarly, one would expect a steady increase in variation from year to year corresponding to the broader range of achievement skills obtained with maturation. Finally with respect to skewness, the skew of the out-of-level test scores should not be consistently different from the skew found in the other distributions

for that type of achievement.

It is now left to determine which of these hypotheses the data support. To facilitate this process, the essential distributional characteristics may be represented in easily recognizable and interpretable form by schematic plots developed by Tukey (see EXPLORATORY DATA ANALYSIS, 1977). Appendix II.C gives these schematic plots for both reading (pp. 1-6) and mathematics (pp. 7-12) by time for each treatment group within each cohort; and, III.C. for each individual school within each cohort. To interpret these plots one will notice that for each of the four testing time points there is a rectangular box subdivided by a dashed line. The box corresponds to the interquartile range and the dashed line is the median. Hence, the length of the box indicates variation in the distribution. A secondary indicator of variation is the range covered by the dashed lines protruding upward and downward from the box. This corresponds to what shall be called the base range which is the range,of scores falling between the 5th and 95th percentiles. The plus (+) sign inside of the box is the mean. The location of the median relative to the mean as well as its location relative to the ends of the box (25th and 75th percentiles) give an indication of the skewness -- e.g. the mean above the median or the larger enclosed area being above the median indicates positive skew. A zero indicates one or more outliers which in a normal distribution are expected to occur once in every twenty observations. The asterisk (*) indicates one or more outliers which in a normal distribution are expected to occur once in every two hundred observations. Outliers are important to recognize since they decrease the interpretability of other distribution

characteristics. Finally, since the computer program adjusts the vertical axis interval to yield the most descriptive plot for each group, the mark "*-+-*" has been placed at point (76.8,300) on each plot.

First, consider the distribution patterns for the various groups (BTGC's) in Cohort 3. For the reading scores (II.C. pp 1-3) one notices that Group 2 started at the lowest point and Group 0 at the highest point for the 3 groups, and yet they all show the same pattern of median growth from year to year. Furthermore, the greatest growth appears to occur between 76.3 and 77.3 for all three groups. Recalling that the 76.3 and 77.3 tests in Cohort 3 were both at level 1 of the CTBS this is certainly contrary to expectations under the hypothesis of a floor effect. Furthermore, note that the group having the variation and skewness pattern closest to what might be expected under the hypothesis of a floor effect is Group 0, yet it is illogical to suppose that the highest scoring group would have the greatest possibility of a floor effect. Thus for Cohort 3 reading the alternative hypothesis of no floor effect is supported.

Now consider the reading score (TRE) distribution for Cohort 3 schools (NOSCH's, appendix III.C). In examining these schematic plots one realizes that individually several of these schools do not present a distribution pattern that fits well with either of the expected patterns. For example School 302, School 322, and School 334 tend to show a slight decline from the 77.8 to 78.3 time points. While this is an unusual pattern it is one clearly contradictory to what would be expected under floor effect conditions. One will also recognize a few unusual patterns in variation, most notable of which is in School 322, where an extreme increase in variance

occurs at 77.3 with a subsequent decline to a more expectable variation at the following dates. While there are test related possible explanations for such a phenomenon (e.g. unstandardized administration of the 77.3 test such as lengthening time allotment or coaching) as well as school related possibilities (e.g. the introduction of a new program, materials or staff member to that particular group of students that really excite several students more than others) it is again clear that such a pattern is contrary to the floor effect hypothesis. Similarly as one looks at skewness one finds a couple of unusual patterns (e.g. School 304, and School 379) yet again a floor effect is not indicated. Finally, the reader should be cautioned that in some schools, particularly numbers 320 and 334, the sample sizes are rather small.

Now consider the mathematics score distributions for Cohort 3. Looking at Appendix II.C. (pp. 7-9) one notes that for Groups 0 and 1 the patterns of median, variance and skewness together are supportive of the no floor effect hypothesis. The distribution pattern for Group 2, however, is a bit unusual in that a loss appears to occur for the out-of-level testing. Yet the largest gain occurs from 1976.3 to 1977.3 where the same level was given as that of 1977.8. This would not be expected under floor effect conditions. It may also be remarked that the variance and skewness patterns for Group 2 do not indicate a floor effect. Thus even though Group 2 distributions are unusual they do not imply a floor effect.

An examination of mathematics distributions by school yields an identical conclusion. Here (see Appendix III.C.) it will be seen that for

Schools 322, 382, and 395 in Cohort 3, the pattern found for Group 2 is replicated, and indeed these schools are exactly those which make up Group 2. This situation is more intriguing still when one sees that the median gain from 1976.3 to 1978.3 is superior for Group 2 to that for either of the other two groups. Moreover, it is noted that this is true for reading as well as for mathematics.

Attention is now directed to Cohort 4, recalling that the pattern of test levels administered is now 1,2,1,2 (see Appendix I.A.). Again reading distributions, (TRE) will be considered first.

In examining the reading distributions for each group (see Appendix II.C., pp. 4-6) one readily recognizes that the pattern presented by group 0 and group 1 fit very nicely with the alternative hypothesis of no floor effect. Group 2 on the other hand has a pattern that fits the hypothesis that a floor effect does exist. Yet this is a little unusual since groups 2 and 1 both start with nearly identical medians, and group 2 for Cohort 3 showed the greatest growth. Here it shows the least growth.

For this cohort a great deal of clarity is added by considering the TRE distribution by schools. (See Appendix III.C). Of particular interest is School 322, in which the pattern of median growth is quite strange. Indeed (see Appendix III.B.) the median growth for the two year period is only 6 ESS units in this school, yet other schools started with the same and even lower TRE's in 76.3 and still showed substantial gain. As an example of this, note School 382. This school together with School 322 make up Group 2 for Cohort 4, yet it showed a superior 2 year median gain of 120 ESS units.

Noting the number of cases in each of these two schools which for Cohort 4 make up Group 2, it is obvious that the trend found for group 2 TRE distributions (p. 6 Appendix II.A.) is the result of the unexplainable pattern found in School 322. With respect to the question of floor effect in School 322, these data simply to not yield substantial support for either hypothesis. However, in light of the fact that other schools in Cohort 4 with lower starting TRE scores do not show signs of floor effect it is reasonable to suppose that no floor effect is present in School 322 either.

As just indicated the other schools in Cohort 4 show patterns which generally support the hypothesis that a floor effect does not exist. However, in examining the TRE distribution patterns for the remaining schools in Cohort 4 one recognizes another slightly unusual school, namely 320. Although far less unusual than 322, it will be seen (Appendix III.C.) that an apparent decline occurs in medians from 1976.3 to 1977.3 while an apparent increase in mean occurs. While this phenomena is worth the attention of the educators responsible for interpreting test results, it is opposite to what would be excepted under floor effect conditions for this cohort.

Lastly, consider the TME distributions for Cohort 4. Turning again to Appendix II.C. (pp. 10-12) one sees the out-of-level test results (77.8) for all schools appear to be lower than one might expect under the no floor effect hypothesis. However, the variance and skewness patterns are generally contrary to what one would expect under the floor effect hypothesis. Again it looks as if the school TME distributions for Cohort 4 will be more

instructive.

In examining the TME distributions for each school within Cohort 4 (Appendix III.C.) one finds a fairly consistent pattern, with the median gain being least between 77.3 and 77.8. This could be expected to some extent by realizing that a summer vacation occurs between these two test administrations, and that mathematics is perhaps more likely to be forgotten over the summer than reading for lower scoring children. A floor effect is not seen as a reasonable explanation of these results due to the fact that gains from 77.3 to 78.3, where level 2 was administered at both dates, are consistently comparable to gains from 76.3 (level 1) to 77.3 (level 2). Moreover, the variance and skewness are generally not consistent with the floor effect hypothesis.

There are two schools, 322 and 320, in Cohort 4 which do noticably deviate from the general pattern just stated. One will recall that School 322 had the unexplainable TRE distributions as well. Although the TME distribution pattern for School 322 is not quite as strange as the TRE distribution pattern, the two sets show the same tendency. These patterns are very much like what one would expect if a great deal of guessing, with little else, had taken place. Note that if a floor effect were in operation there would at least be a gain from one administration of level 1 to another administration of level 1 and likewise for level 2, yet these gains are 7 and 9 ESS units respectively. Indeed if one were to suppose that a floor effect was present in school 322 for either TRE or TME distribution one would have to believe that the floor effect is so strong that all the scores at each test date are almost entirely the

result of chance. On the other hand if one were to believe that no floor effect exists, as seems more likely looking at other schools with similar initial scores, one is left with the impression that no learning is taking place whatsoever. The final alternative is that the data obtained for this school or the way in which scores were matched (matching of students was done by student number) was not valid. Whatever the reason for the peculiar distribution pattern in School 322 the answer is not to be found in the data.

In School 320 one also notes that for TME the 77.8, out-of-level, distribution of scores is markedly lower than the 77.3 distribution of scores. This may be due to the small sample size (N=12) available for this school. It is not thought to be consistent with what would be expected as a result of a floor effect because of the similarity in gain from 76.3 (level 1) to 77.3 (level 2) and the gain from 77.3 to 78.3 (both level 2). Skewness and variation also do not fit the floor effect hypothesis.

In summary, the pattern of distributional characteristics for both TRE and TME have been examined for each of two cohorts to determine whether a floor effect might exist for groups of pupils in the upper elementary grades. As a result it was concluded that a floor effect is not a porblem for either the groups (BTGC) or the schools (NOSCH) studied. Of course there may be certain individuals that could be better measured out-of-level; however, the number of such individuals combined with the possible floor effect present for those select individuals is sufficiently small that group comparisons are relatively unaffected. The same can be

said with regard to possible ceiling effects, (recall that upper outliers were present in a number of cases). Thus, it is recommended that, where entire classes within a building are to be tested with one level of the CTBS, testing be done in level.

With respect to compensatory program evaluations in this school system, based upon the data presented in this study, there is very little reason to suspect that the results of such evaluations or program comparisons would be biased by a floor effect in the CTBS data. Indeed it has been seen that some schools (e.g. 382) having initially low scores in 1976.3, have, over a two year period, made outstanding gains relative to the initially high scoring schools.

Finally, it has been noted that certain schools (e.g. NOSCH #322) demonstrate highly unusual patterns of growth. Thus areas for further study have been identified for both the school system and Westinghouse. Indeed such questions as to why the 1977.3 test score distributions are often more variable than would generally be expected, why in School 322 practically no gain is registered over a two year period, and why certain schools like 382 appear to do so well, are all questions which deserve answers that can be found only by personal contact and familiarity with what is going on in these places.

REFERENCES

1. Campbell & Boruch

"Making a case for randomized assignment to treatments by considering the alternatives: Six ways in which Quasi-Experimental Evaluations in compensatory education tend to underestimate effects"
In Bennet & Lumsdaine, (Eds.) Evaluation and experiment: Some critical issues in assessing social programs. New York: Academic Press, 1975 pp. 195-296.

2. Tukey, John W., Exploratory Data Analysis. Addison-Wesley Company, 1977.

## REFERENCES ON "OUT-OF-LEVEL" TESTING

Ayrer, J.E., & McNamara, T.C. Survey testing on an out-of-level basis. Journal of Educational Measurement, 1973, 10, 79-84.

Barnes, J. A report on individualized testing in Atlanta. In Putting current ideas in measurement to work in the schools. Proceedings from the Thirteenth Annual Houghton Mifflin Measurement Conference, Iowa City, Iowa, April 26-27, 1977.

Crowder, C.R., & Gallas, E.J. Relation of out-of-level testing to ceiling and floor effects on third and fifth grade students. Research and Evaluation Department, Tucson Unified School District. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Canada, March 27-31. 1978.

Fisher, J.A. The use of out-of-grade tests with retarded and accelerated readers. Doctoral dissertation, University of Iowa, 1961. (University Microfilms No. 61-5564).

Fuentes, E.J., & Jeffress, E.L. The use of teacher estimates of children's achievement in selecting appropriate test levels vs. blanket out-of-level testing: the problem of an efficient method of matching the student's functional level with the proper test level. Triangle Park, North Carolina: Center for Educational Research and Evaluation Research Triangle Institute, 1978.

Haenn, J.F., & Proctor, D.C. A practitioner's guide to out-of-level testing. NTS Research Corporation, Durham, N.C.: Paper prepared for presentation at the Annual Meeting of the American Educational Research Association in Toronto, Canada, March 1978.

Hieronymus, A.N. Individualized testing with the Iowa Tests of Basic Skills. In Putting current ideas in measurement to work in the schools. Proceedings from the Thirteenth Annual Houghton Mifflin Measurement Conference, Iowa City, Iowa, April 26-27, 1977.

Horst, D.P., & Fagan, B.M. Common evaluation hazards: ESEA Title I Evaluation and reporting system, Technical Paper No. 14. RMC Research Corporation, Mountain View, California, October 1976.

Long, J.V., Schaffran, J.A., & Kellogg, T.M. Effects of out-of-level survey testing of reading achievement scores of Title I, ESEA students. Journal of Educational Measurement, 1977, 14, 203-213.

Mendro, R. A report on individualized testing in Dallas. In Putting current ideas in measurement to work in the schools. Proceedings from the Thirteenth Annual Houghton Mifflin Measurement Conference, Iowa City, Iowa, April 26-27, 1977

Plake, B.S., & Hoover, H.D. The comparability of equal raw scores for children at different grade levels: an issue in "out-of-level" testing. Paper presented at NCME annual meeting, New York, April 1977.

Powers, S., & Gallas, E.J. Implications of out-of-level testing for ESEA Title I students. Tucson Unified School District, Tucson, Arizona: Department of Research and Evaluation. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Canada, March 27-31, 1978.

Roberts, A.H. Out of Level Testing. Technical Paper No. 6 of the Title I Evaluation and Reporting System. Mountainview, California: RMC Research Corp., October 1976.

Roberts, S.J. Test floor and ceiling effects: ESEA Title I Evaluation and Reporting System. Mountainview, Calif.: RMC Research Corp. Manuscript submitted to U.S. Office of Education, January 1978.

Slaughter, H.B., & Gallas, E.J. Will out-of-level norm-referenced testing improve the selection of program participants and the diagnosis of reading comprehension in ESEA Title I programs? Tucson Unified School District, Tucson, Arizona: Department of Research and Evaluation. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Canada, March 27-31, 1978.

Wick, J.W. A report on individualized testing in Chicago. In Putting current ideas in measurement to work in the schools. Proceedings from the Thirteenth Annual Houghton Mifflin Measurement Conference, Iowa City, Iowa, April 26-27, 1977.

Wick, J.W. Testing students at functioning reading level: A two-year report from Chicago. Manuscript submitted for publication, 1977.

Yoshida, R.K. Out-of-level testing of special education students with a standardized achievement battery. Journal of Educational measurement, 1976, 13, 215-221.

TABLE I.A

Forms and levels of the CTBS

Administered at Four Time Points

| | 1976.3 | 1977.3 | 1977.8 | 1978.3 |
|---|---|---|---|---|
| Cohort 3 | Grade = 3<br>Form = S<br>Level = 1 | Grade = 4<br>Form = T<br>Level = 1 | Grade = 5<br>Form = T<br>Level = 1 | Grade = 5<br>Form = S<br>Level = 2 |
| Cohort 4 | Grade = 4<br>Form = T<br>Level = 1 | Grade = 5<br>Form = S<br>Level = 2 | Grade = 6<br>Form = T<br>Level = 1 | Grade = 6<br>Form = T<br>Level = 2 |

TABLE I.B

Cross Reference Table of Schools (NOSCH)

within Groups (BTGC) within Cohort

-------- COHORT=3 --------

| BTGC | NOSCH |
|---|---|
| 0 | 302 |
| 0 | 309 |
| 0 | 320 |
| 2 | 322 |
| 1 | 334 |
| 1 | 344 |
| 1 | 379 |
| 2 | 382 |
| 2 | 395 |

-------- COHORT=4 --------

| BTGC | NOSCH |
|---|---|
| 0 | 302 |
| 0 | 309 |
| 0 | 320 |
| 2 | 322 |
| 1 | 334 |
| 1 | 344 |
| 1 | 379 |
| 2 | 382 |
| 0 | 368 |

TABLE II A

(Pages 22-27)

DISTRIBUTION SUMMARY STATISTICS FOR TOTAL READING EXPANDED STANDARD SCORES (TRE), TOTAL MATHEMATICS EXPANDED STANDARD SCORES (TME) AND COMPONENT SUBTESTS FOR EACH TREATMENT GROUP (BTGC) IN EACH COHORT

DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 BIGC = 0

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 88 | 364.8182 | 62.2547 | 239 | 549 | 0.6668 | 0.3601 |
| 1977.3 | 88 | 417.2386 | 87.3333 | 213 | 609 | 0.5359 | -0.0413 |
| 1977.8 | 88 | 421.6932 | 85.3079 | 221 | 609 | 0.0897 | -0.1921 |
| 1978.3 | 88 | 432.9886 | 80.1392 | 256 | 660 | 0.1854 | 0.6437 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 88 | 366.3068 | 60.4841 | 243 | 515 | 0.6091 | 0.2813 |
| 1977.3 | 88 | 416.0682 | 86.0371 | 169 | 590 | 0.1882 | -0.0679 |
| 1977.8 | 88 | 419.1136 | 83.7578 | 230 | 590 | 0.1730 | -0.4169 |
| 1978.3 | 88 | 432.9773 | 84.7669 | 210 | 633 | 0.3075 | 0.5273 |
| **READ COMP** | | | | | | | |
| 1976.3 | 88 | 380.8750 | 72.4402 | 240 | 571 | 0.1977 | -0.1682 |
| 1977.3 | 88 | 433.9432 | 83.2047 | 272 | 624 | 0.3622 | -0.3082 |
| 1977.8 | 88 | 440.7273 | 85.1840 | 249 | 602 | -0.3301 | -0.2799 |
| 1978.3 | 88 | 449.0341 | 82.0193 | 240 | 679 | 0.0419 | 0.7765 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 88 | 353.7841 | 42.5439 | 257 | 475 | 0.1283 | 0.3112 |
| 1977.3 | 88 | 390.3750 | 52.1740 | 278 | 511 | 0.4955 | 0.2201 |
| 1977.8 | 88 | 404.1932 | 54.3947 | 274 | 520 | 0.1219 | -0.1250 |
| 1978.3 | 88 | 430.4091 | 59.2700 | 279 | 621 | 0.1128 | 1.1043 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 88 | 361.2273 | 43.3069 | 268 | 465 | 0.0731 | -0.2074 |
| 1977.3 | 88 | 393.1250 | 42.8139 | 289 | 470 | 0.0302 | -0.6044 |
| 1977.8 | 88 | 401.3182 | 43.4010 | 283 | 470 | -0.6029 | 0.2844 |
| 1978.3 | 88 | 436.6477 | 52.0963 | 293 | 547 | -0.3878 | 0.1320 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 88 | 368.2727 | 56.8003 | 225 | 536 | 0.4007 | 0.2930 |
| 1977.3 | 88 | 403.7159 | 66.7145 | 217 | 550 | -0.0881 | -0.1657 |
| 1977.8 | 88 | 424.7159 | 69.1788 | 296 | 550 | 0.0446 | -0.7008 |
| 1978.3 | 88 | 436.4886 | 76.8475 | 216 | 677 | 0.2279 | 1.0751 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 88 | 355.2841 | 61.0221 | 212 | 501 | -0.1510 | -0.1679 |
| 1977.3 | 88 | 395.2500 | 74.7748 | 207 | 540 | -0.0197 | -0.4186 |
| 1977.8 | 88 | 413.9773 | 69.4309 | 185 | 540 | -0.2232 | 0.3258 |
| 1978.3 | 88 | 436.4318 | 78.5416 | 248 | 645 | 0.2608 | 0.4340 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 BYGC = 1

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 209 | 329.6459 | 60.2287 | 217 | 549 | 0.9512 | 0.9623 |
| 1977.3 | 209 | 351.2297 | 67.7607 | 221 | 583 | 0.9306 | 1.0571 |
| 1977.8 | 209 | 365.5646 | 71.8129 | 229 | 568 | 0.7697 | 0.4730 |
| 1978.3 | 209 | 382.2727 | 75.1782 | 211 | 625 | 0.6218 | 0.4760 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 209 | 326.6172 | 58.8552 | 214 | 538 | 0.9598 | 0.9856 |
| 1977.3 | 209 | 348.4019 | 63.0359 | 199 | 555 | 0.7613 | 0.4541 |
| 1977.8 | 209 | 357.0526 | 68.2656 | 215 | 555 | 0.7615 | 0.3979 |
| 1978.3 | 209 | 384.2392 | 76.4161 | 230 | 633 | 0.6677 | 0.7085 |
| **READ COMP** | | | | | | | |
| 1976.3 | 209 | 352.8995 | 66.8889 | 174 | 603 | 0.6931 | 0.5852 |
| 1977.3 | 209 | 373.8804 | 73.3426 | 224 | 602 | 0.6682 | 0.6849 |
| 1977.8 | 209 | 393.7943 | 75.1371 | 209 | 602 | 0.5839 | 0.4709 |
| 1978.3 | 209 | 399.1962 | 76.2565 | 240 | 650 | 0.5785 | 0.3349 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 209 | 327.6938 | 44.5390 | 207 | 464 | 0.5230 | 0.4845 |
| 1977.3 | 209 | 355.9139 | 53.4906 | 232 | 511 | 0.2020 | 0.2643 |
| 1977.8 | 209 | 367.4019 | 54.5695 | 242 | 511 | 0.3353 | -0.0252 |
| 1978.3 | 209 | 393.8995 | 55.9506 | 224 | 589 | 0.2503 | 0.7877 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 209 | 341.2871 | 46.7851 | 254 | 465 | 0.6966 | 0.2539 |
| 1977.3 | 209 | 369.0622 | 51.0773 | 252 | 470 | -0.1154 | -0.4792 |
| 1977.8 | 209 | 377.0191 | 48.4941 | 241 | 470 | -0.1103 | -0.4350 |
| 1978.3 | 209 | 410.2297 | 52.6054 | 254 | 547 | -0.2570 | 0.1285 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 209 | 335.4833 | 51.4701 | 201 | 536 | 0.6535 | 1.1105 |
| 1977.3 | 209 | 361.3923 | 62.1433 | 217 | 550 | 0.3146 | -0.0520 |
| 1977.8 | 209 | 376.2871 | 66.7370 | 155 | 550 | 0.2127 | -0.1841 |
| 1978.3 | 209 | 390.4833 | 69.7771 | 216 | 599 | 0.5513 | 0.5700 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 209 | 320.3158 | 60.7198 | 157 | 544 | 0.4049 | 1.3280 |
| 1977.3 | 209 | 348.1722 | 69.9288 | 207 | 540 | 0.4613 | 0.1172 |
| 1977.8 | 209 | 360.1148 | 73.5647 | 185 | 540 | 0.2828 | 0.0733 |
| 1978.3 | 209 | 385.3445 | 71.4703 | 194 | 601 | 0.2497 | 0.5173 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 BYGC = 2

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 125 | 308.8160 | 42.9242 | 239 | 439 | 0.6706 | -0.0360 |
| 1977.3 | 125 | 365.0640 | 73.2774 | 254 | 597 | 1.2091 | 1.2069 |
| 1977.8 | 125 | 362.7840 | 53.7855 | 242 | 553 | 0.3693 | 0.4765 |
| 1978.3 | 125 | 375.8800 | 65.1137 | 211 | 546 | 0.2345 | -0.5424 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 125 | 310.8400 | 40.3626 | 229 | 437 | 0.4542 | -0.0503 |
| 1977.3 | 125 | 367.3920 | 81.4607 | 243 | 590 | 1.1638 | 0.9494 |
| 1977.8 | 125 | 361.6640 | 50.4158 | 265 | 497 | 0.4837 | -0.1458 |
| 1978.3 | 125 | 383.9520 | 67.4417 | 210 | 577 | 0.2906 | 0.2774 |
| **READ COMP** | | | | | | | |
| 1976.3 | 125 | 327.2240 | 51.9423 | 192 | 462 | 0.4047 | -0.0256 |
| 1977.3 | 125 | 383.6880 | 69.4485 | 237 | 580 | 0.7729 | 0.4819 |
| 1977.8 | 125 | 383.2720 | 66.5010 | 192 | 602 | 0.1009 | 0.8249 |
| 1978.3 | 125 | 386.5040 | 71.1294 | 208 | 584 | 0.1050 | -0.4441 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 125 | 301.9440 | 38.9450 | 217 | 412 | 0.3528 | -0.2459 |
| 1977.3 | 125 | 360.7600 | 48.8370 | 255 | 511 | 0.6937 | 0.9836 |
| 1977.8 | 125 | 349.9280 | 45.4130 | 237 | 511 | 0.4652 | 1.0965 |
| 1978.3 | 125 | 390.9600 | 55.4110 | 268 | 563 | -0.0800 | -0.0830 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 125 | 310.3600 | 36.0028 | 207 | 428 | 0.3772 | 0.4557 |
| 1977.3 | 125 | 363.9120 | 39.7316 | 269 | 470 | 0.3858 | 0.0089 |
| 1977.8 | 125 | 360.9920 | 40.2367 | 252 | 470 | 0.4191 | 0.5216 |
| 1978.3 | 125 | 400.6880 | 50.5464 | 270 | 569 | 0.0694 | 0.5260 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 125 | 316.5760 | 46.3199 | 201 | 483 | 0.4418 | 0.4498 |
| 1977.3 | 125 | 380.2560 | 64.1193 | 236 | 550 | 0.5201 | 0.3756 |
| 1977.8 | 125 | 359.9920 | 67.5812 | 217 | 550 | 0.2683 | -0.2609 |
| 1978.3 | 125 | 398.6640 | 75.4927 | 261 | 599 | 0.2942 | -0.2483 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 125 | 306.6320 | 56.1712 | 157 | 470 | -0.0657 | 0.5497 |
| 1977.3 | 125 | 360.2800 | 68.1110 | 207 | 540 | 0.4102 | 0.2186 |
| 1977.8 | 125 | 336.3440 | 65.8819 | 185 | 540 | 0.2181 | 0.4026 |
| 1978.3 | 125 | 396.8560 | 64.1106 | 194 | 568 | -0.0612 | 0.5500 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 BIGC = 0

| SCORES / / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 109 | 388.0000 | 58.1836 | 253 | 566 | 0.5545 | 0.7989 |
| 1977.3 | 109 | 427.2477 | 72.2261 | 273 | 681 | 1.0211 | 1.9098 |
| 1977.8 | 109 | 434.5963 | 63.1747 | 303 | 597 | 0.5497 | -0.0643 |
| 1978.3 | 109 | 464.4495 | 72.2005 | 323 | 672 | 0.6243 | 0.2440 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 109 | 382.8899 | 56.5727 | 229 | 538 | 0.4185 | 0.8478 |
| 1977.3 | 109 | 423.3486 | 72.2080 | 230 | 673 | 0.9015 | 1.6807 |
| 1977.8 | 109 | 423.5229 | 60.3762 | 292 | 590 | 0.3748 | -0.1509 |
| 1978.3 | 109 | 460.8991 | 81.9657 | 321 | 690 | 0.8953 | 0.2284 |
| **READ COMP** | | | | | | | |
| 1976.3 | 109 | 411.3486 | 67.7690 | 240 | 571 | 0.1935 | 0.4235 |
| 1977.3 | 109 | 444.8624 | 78.5204 | 286 | 679 | 0.6300 | 0.8181 |
| 1977.8 | 109 | 460.6330 | 63.8737 | 304 | 602 | 0.1910 | -0.2196 |
| 1978.3 | 109 | 485.6606 | 78.4724 | 242 | 718 | 0.1460 | 0.8142 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 109 | 369.7431 | 42.7619 | 232 | 475 | -0.0141 | 1.1511 |
| 1977.3 | 109 | 417.0367 | 54.7259 | 296 | 604 | 0.6751 | 1.2437 |
| 1977.8 | 109 | 415.9266 | 43.5286 | 329 | 520 | 0.3832 | -0.3740 |
| 1978.3 | 109 | 451.7982 | 52.1070 | 318 | 588 | -0.0277 | 0.3576 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 109 | 375.8899 | 41.3108 | 268 | 465 | 0.0238 | 0.0739 |
| 1977.3 | 109 | 425.1927 | 50.9390 | 301 | 547 | 0.0223 | 0.0909 |
| 1977.8 | 109 | 413.8899 | 33.3867 | 309 | 470 | -0.3584 | -0.1038 |
| 1978.3 | 109 | 466.5505 | 64.7760 | 324 | 617 | 0.2504 | 0.0257 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 109 | 384.6697 | 56.5969 | 244 | 536 | 0.5007 | 0.3159 |
| 1977.3 | 109 | 422.7156 | 66.8403 | 301 | 635 | 0.6758 | 0.9190 |
| 1977.8 | 109 | 436.5321 | 60.1236 | 296 | 550 | -0.0638 | -0.3787 |
| 1978.3 | 109 | 451.3028 | 55.3945 | 333 | 570 | -0.0270 | -0.6221 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 109 | 372.9174 | 66.1088 | 157 | 544 | -0.5693 | 1.3835 |
| 1977.3 | 109 | 415.5688 | 72.4453 | 248 | 601 | 0.4590 | 0.3178 |
| 1977.8 | 109 | 426.4862 | 61.3568 | 266 | 540 | -0.0874 | 0.0686 |
| 1978.3 | 109 | 455.8073 | 67.3196 | 271 | 608 | -0.0026 | -0.0256 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 BIGC = 1

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 239 | 350.4268 | 62.3214 | 209 | 607 | 0.5104 | 0.6041 |
| 1977.3 | 239 | 374.9958 | 67.7125 | 171 | 554 | 0.0977 | -0.6384 |
| 1977.8 | 239 | 399.6611 | 71.6278 | 204 | 618 | 0.2542 | 0.2662 |
| 1978.3 | 239 | 430.5439 | 73.5260 | 233 | 656 | 0.0997 | 0.1411 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 239 | 344.6736 | 61.8276 | 181 | 538 | 0.3171 | 0.0636 |
| 1977.3 | 239 | 378.0544 | 62.0174 | 210 | 541 | 0.0965 | -0.1969 |
| 1977.8 | 239 | 393.0544 | 70.8817 | 199 | 590 | 0.1848 | 0.0817 |
| 1978.3 | 239 | 422.7992 | 79.1938 | 230 | 690 | 0.4498 | 0.4202 |
| **READ COMP** | | | | | | | |
| 1976.3 | 239 | 376.7531 | 70.9429 | 209 | 643 | 0.5334 | 0.3697 |
| 1977.3 | 239 | 391.1590 | 76.8002 | 191 | 602 | 0.1176 | -0.5427 |
| 1977.8 | 239 | 425.0042 | 74.9342 | 224 | 624 | 0.0422 | -0.1174 |
| 1978.3 | 239 | 458.8326 | 74.6711 | 248 | 692 | -0.0339 | 0.6798 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 239 | 355.1674 | 48.9396 | 207 | 502 | 0.2614 | 0.5975 |
| 1977.3 | 239 | 386.7322 | 50.1225 | 268 | 524 | 0.0737 | -0.2856 |
| 1977.8 | 239 | 396.3180 | 45.5517 | 227 | 511 | 0.1143 | 0.4864 |
| 1978.3 | 239 | 438.3347 | 55.3151 | 292 | 632 | 0.2233 | 0.7861 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 239 | 368.7322 | 47.8382 | 254 | 465 | 0.0157 | -0.3030 |
| 1977.3 | 239 | 404.9331 | 49.1560 | 286 | 547 | 0.1211 | -0.2545 |
| 1977.8 | 239 | 401.4686 | 37.9751 | 252 | 470 | -0.4333 | 0.4793 |
| 1978.3 | 239 | 459.0837 | 58.3959 | 293 | 617 | 0.1755 | 0.1204 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 239 | 362.6485 | 60.8950 | 225 | 536 | 0.4877 | -0.0668 |
| 1977.3 | 239 | 386.9498 | 61.7483 | 239 | 543 | 0.0869 | -0.2926 |
| 1977.8 | 239 | 406.5774 | 60.6967 | 236 | 550 | 0.2085 | -0.2607 |
| 1978.3 | 239 | 431.2050 | 70.9782 | 260 | 626 | 0.2089 | -0.2961 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 239 | 346.3222 | 67.1928 | 157 | 544 | 0.1652 | 0.0995 |
| 1977.3 | 239 | 374.5105 | 71.5967 | 194 | 601 | -0.1293 | 0.4300 |
| 1977.8 | 239 | 401.6318 | 66.3341 | 228 | 540 | -0.0677 | -0.0500 |
| 1978.3 | 239 | 425.6569 | 72.8003 | 219 | 651 | 0.0176 | 0.5520 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 BIGC = 2

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 98 | 346.3061 | 49.5893 | 253 | 455 | 0.0189 | -1.2009 |
| 1977.3 | 98 | 382.3673 | 60.1876 | 230 | 584 | 0.9006 | 2.0476 |
| 1977.8 | 98 | 371.0510 | 57.9880 | 221 | 568 | 0.2824 | 0.7689 |
| 1978.3 | 98 | 395.3776 | 62.7403 | 280 | 530 | 0.0859 | -1.0984 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 98 | 340.7857 | 46.8283 | 255 | 467 | 0.3538 | -0.2022 |
| 1977.3 | 98 | 393.3776 | 69.3672 | 210 | 673 | 1.3206 | 4.5500 |
| 1977.8 | 98 | 373.3571 | 56.3004 | 230 | 555 | 0.2809 | 0.8597 |
| 1978.3 | 98 | 385.9694 | 55.7654 | 266 | 518 | 0.1411 | -0.5908 |
| **READ COMP** | | | | | | | |
| 1976.3 | 98 | 371.1735 | 56.5809 | 268 | 462 | -0.0773 | -1.3775 |
| 1977.3 | 98 | 386.5510 | 65.7416 | 256 | 602 | 0.5784 | 0.3293 |
| 1977.8 | 98 | 385.4388 | 70.3080 | 192 | 580 | -0.0885 | 0.1524 |
| 1978.3 | 98 | 424.4898 | 70.9299 | 274 | 560 | -0.0876 | -0.9536 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 98 | 346.0408 | 37.7992 | 245 | 445 | -0.2131 | -0.0058 |
| 1977.3 | 98 | 386.3469 | 56.3295 | 301 | 604 | 1.1796 | 2.2158 |
| 1977.8 | 98 | 368.0612 | 46.9711 | 263 | 520 | 0.7668 | 1.2336 |
| 1978.3 | 98 | 404.8673 | 55.8235 | 287 | 553 | 0.2131 | -0.1609 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 98 | 357.7347 | 41.5577 | 275 | 465 | 0.0322 | -0.3212 |
| 1977.3 | 98 | 398.6633 | 56.4850 | 301 | 569 | 0.9224 | 1.1154 |
| 1977.8 | 98 | 378.5918 | 42.3183 | 261 | 470 | 0.0934 | -0.1375 |
| 1978.3 | 98 | 415.4388 | 58.3897 | 230 | 584 | -0.1754 | 0.8123 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 98 | 360.0102 | 53.4843 | 244 | 494 | 0.4545 | -0.2522 |
| 1977.3 | 98 | 400.1122 | 67.0754 | 281 | 635 | 0.9950 | 2.0188 |
| 1977.8 | 98 | 372.5510 | 66.9822 | 167 | 550 | -0.0315 | 0.8185 |
| 1978.3 | 98 | 415.1429 | 72.0525 | 236 | 597 | 0.2449 | -0.1809 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 98 | 339.8469 | 55.4158 | 157 | 501 | -0.5766 | 2.3226 |
| 1977.3 | 98 | 377.1939 | 65.1912 | 248 | 645 | 0.9240 | 2.2936 |
| 1977.8 | 98 | 358.9592 | 68.0673 | 185 | 540 | 0.4460 | 0.3612 |
| 1978.3 | 98 | 400.4082 | 68.8270 | 219 | 577 | -0.1437 | 0.1103 |

TABLE II B

(Pages 30-31)

EXPANDED STANDARD SCORES CORRESPONDING TO SELECTED PERCENTILE RANKS

OF THE DISTRIBUTIONS OF TOTAL READING AND TOTAL MATHEMATICS

SCORES FOR EACH TREATMENT GROUP IN EACH COHORT

READING

PERCENTILES FOR TOTAL READING EXPANDED STANDARD SCORES

| COHORT | BTGC | N | TEST DATE | 1 | 5 | 10 | 25 | MEDIAN 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 0 | 89 | 1976.3 | 239 | 283 | 298 | 320 | 358 | 397 | 445 | 477 | 535 |
| 3 | 0 | 88 | 1977.3 | 213 | 286 | 331 | 353 | 401 | 455 | 568 | 591 | 609 |
| 3 | 0 | 88 | 1977.8 | 221 | 275 | 293 | 371 | 421 | 464 | 553 | 577 | 598 |
| 3 | 0 | 89 | 1978.3 | 256 | 288 | 321 | 390 | 427 | 467 | 532 | 559 | 660 |
| 3 | 1 | 209 | 1976.3 | 232 | 253 | 266 | 288 | 316 | 362 | 413 | 439 | 517 |
| 3 | 1 | 209 | 1977.3 | 223 | 265 | 275 | 299 | 347 | 382 | 435 | 484 | 552 |
| 3 | 1 | 209 | 1977.8 | 237 | 270 | 284 | 308 | 358 | 401 | 464 | 516 | 567 |
| 3 | 1 | 209 | 1978.3 | 222 | 277 | 296 | 330 | 371 | 420 | 483 | 518 | 594 |
| 3 | 2 | 125 | 1976.3 | 239 | 246 | 259 | 277 | 298 | 332 | 375 | 392 | 413 |
| 3 | 2 | 125 | 1977.3 | 257 | 280 | 290 | 309 | 347 | 397 | 468 | 533 | 579 |
| 3 | 2 | 125 | 1977.8 | 243 | 272 | 299 | 328 | 355 | 400 | 430 | 448 | 481 |
| 3 | 2 | 125 | 1978.3 | 220 | 283 | 296 | 324 | 371 | 424 | 470 | 492 | 500 |
| 4 | 0 | 109 | 1976.3 | 254 | 298 | 320 | 352 | 382 | 412 | 463 | 496 | 548 |
| 4 | 0 | 109 | 1977.3 | 276 | 324 | 343 | 381 | 418 | 461 | 515 | 544 | 658 |
| 4 | 0 | 109 | 1977.8 | 304 | 339 | 364 | 388 | 425 | 473 | 523 | 553 | 596 |
| 4 | 0 | 109 | 1978.3 | 324 | 356 | 385 | 409 | 460 | 503 | 563 | 597 | 655 |
| 4 | 1 | 239 | 1976.3 | 223 | 259 | 276 | 308 | 344 | 390 | 426 | 455 | 503 |
| 4 | 1 | 239 | 1977.3 | 246 | 273 | 298 | 317 | 376 | 431 | 461 | 486 | 516 |
| 4 | 1 | 239 | 1977.8 | 224 | 285 | 312 | 355 | 395 | 441 | 496 | 522 | 583 |
| 4 | 1 | 239 | 1978.3 | 268 | 300 | 343 | 376 | 435 | 480 | 513 | 545 | 619 |
| 4 | 2 | 98 | 1976.3 | 253 | 272 | 292 | 303 | 345 | 393 | 406 | 413 | 444 |
| 4 | 2 | 98 | 1977.3 | 230 | 296 | 317 | 336 | 371 | 416 | 445 | 458 | 584 |
| 4 | 2 | 98 | 1977.8 | 221 | 279 | 299 | 330 | 369 | 404 | 441 | 450 | 509 |
| 4 | 2 | 98 | 1978.3 | 280 | 293 | 317 | 344 | 391 | 452 | 477 | 491 | 508 |

## MATHEMATICS

### PERCENTILES FOR TOTAL MATHEMATICS EXPANDED STANDARD SCORES

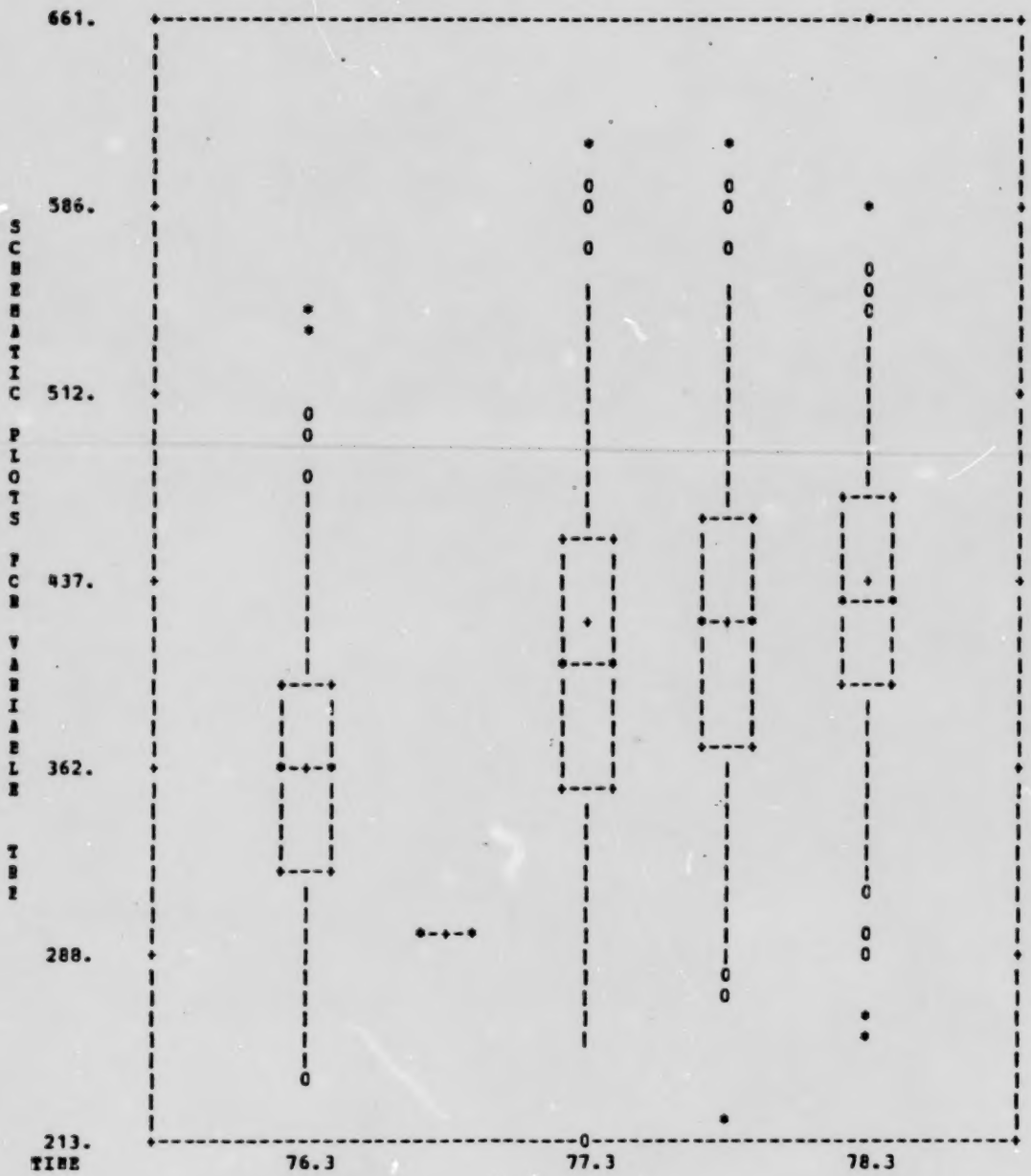
| COHORT | BTGC | N | TEST DATE | PERCENTILES 1 | 5 | 10 | 25 | MEDIAN 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 0 | 88 | 1976.3 | 257 | 286 | 300 | 322 | 360 | 376 | 400 | 423 | 465 |
| 3 | 0 | 88 | 1977.3 | 278 | 302 | 333 | 357 | 381 | 422 | 460 | 501 | 511 |
| 3 | 0 | 88 | 1977.8 | 274 | 309 | 336 | 366 | 401 | 432 | 476 | 507 | 520 |
| 3 | 0 | 88 | 1978.3 | 279 | 324 | 345 | 393 | 434 | 466 | 485 | 524 | 581 |
| 3 | 1 | 209 | 1976.3 | 241 | 262 | 271 | 296 | 324 | 354 | 382 | 410 | 482 |
| 3 | 1 | 209 | 1977.3 | 242 | 263 | 291 | 322 | 358 | 387 | 412 | 455 | 492 |
| 3 | 1 | 209 | 1977.8 | 252 | 278 | 296 | 329 | 365 | 396 | 438 | 483 | 492 |
| 3 | 1 | 209 | 1978.3 | 258 | 303 | 326 | 353 | 397 | 430 | 460 | 486 | 542 |
| 3 | 2 | 125 | 1976.3 | 218 | 249 | 253 | 274 | 298 | 330 | 354 | 364 | 397 |
| 3 | 2 | 125 | 1977.3 | 257 | 286 | 299 | 332 | 357 | 380 | 418 | 451 | 506 |
| 3 | 2 | 125 | 1977.8 | 241 | 276 | 290 | 322 | 348 | 372 | 404 | 426 | 464 |
| 3 | 2 | 125 | 1978.3 | 269 | 290 | 311 | 351 | 395 | 432 | 454 | 471 | 497 |
| 4 | 0 | 109 | 1976.3 | 234 | 304 | 320 | 347 | 366 | 392 | 418 | 450 | 474 |
| 4 | 0 | 109 | 1977.3 | 297 | 328 | 353 | 387 | 411 | 444 | 480 | 511 | 574 |
| 4 | 0 | 109 | 1977.8 | 330 | 347 | 365 | 386 | 407 | 444 | 483 | 492 | 511 |
| 4 | 0 | 109 | 1978.3 | 319 | 350 | 398 | 420 | 453 | 481 | 512 | 539 | 585 |
| 4 | 1 | 239 | 1976.3 | 242 | 274 | 295 | 324 | 355 | 380 | 417 | 445 | 483 |
| 4 | 1 | 239 | 1977.3 | 272 | 301 | 322 | 353 | 387 | 425 | 452 | 469 | 503 |
| 4 | 1 | 239 | 1977.8 | 283 | 329 | 343 | 369 | 390 | 427 | 466 | 474 | 507 |
| 4 | 1 | 239 | 1978.3 | 301 | 342 | 371 | 406 | 438 | 467 | 511 | 526 | 583 |
| 4 | 2 | 98 | 1976.3 | 245 | 274 | 295 | 320 | 347 | 370 | 390 | 397 | 423 |
| 4 | 2 | 98 | 1977.3 | 301 | 312 | 325 | 340 | 376 | 418 | 447 | 478 | 553 |
| 4 | 2 | 98 | 1977.8 | 263 | 302 | 318 | 340 | 360 | 393 | 427 | 451 | 511 |
| 4 | 2 | 98 | 1978.3 | 287 | 316 | 337 | 364 | 404 | 446 | 465 | 487 | 543 |

TABLE II C

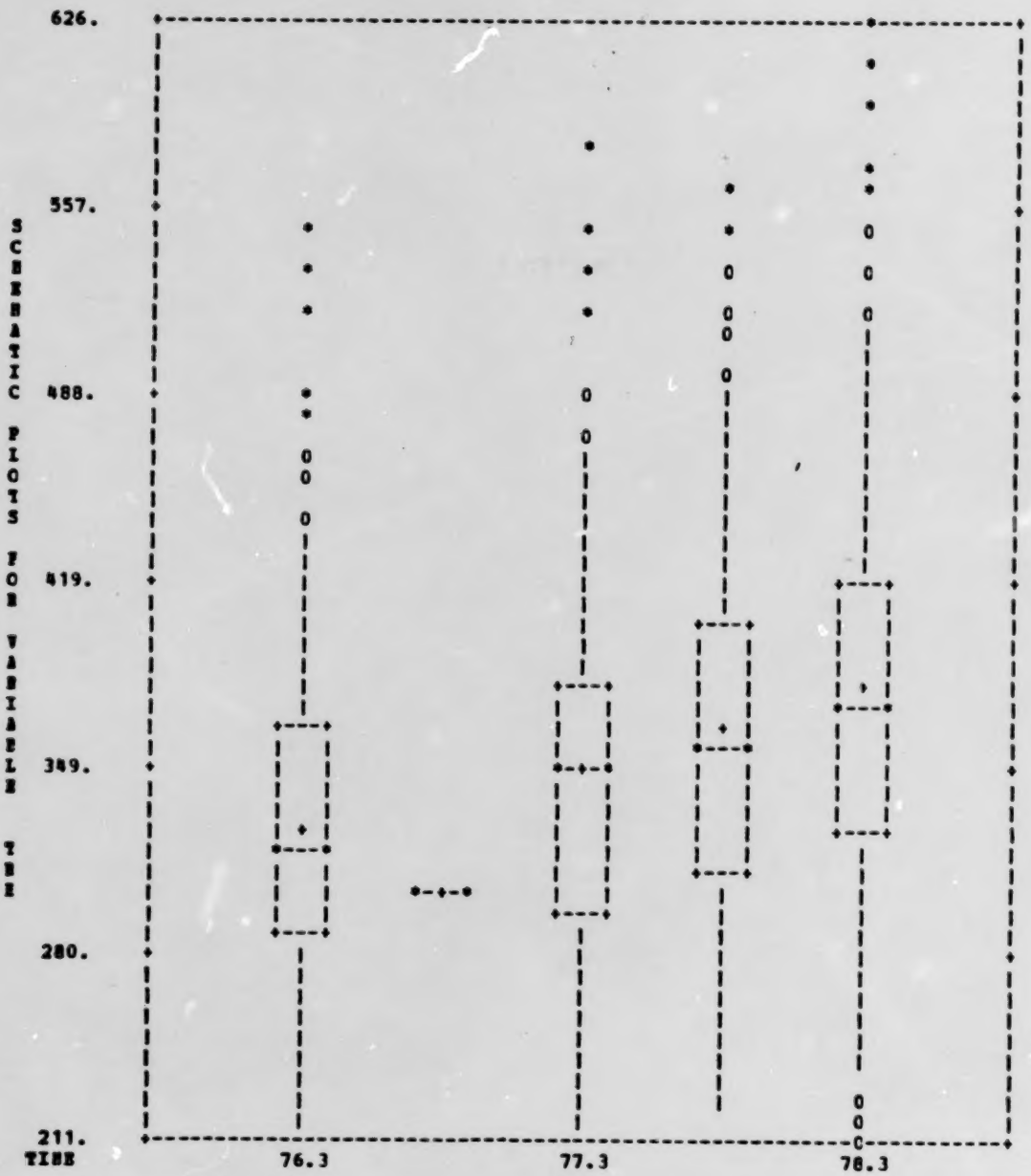
(Pages 34-45)

SCHEMATIC PLOTS OF DISTRIBUTIONS OF TOTAL READING AND TOTAL MATHEMATICS SCORES BY TIME FOR EACH TREATMENT GROUP WITHIN EACH COHORT

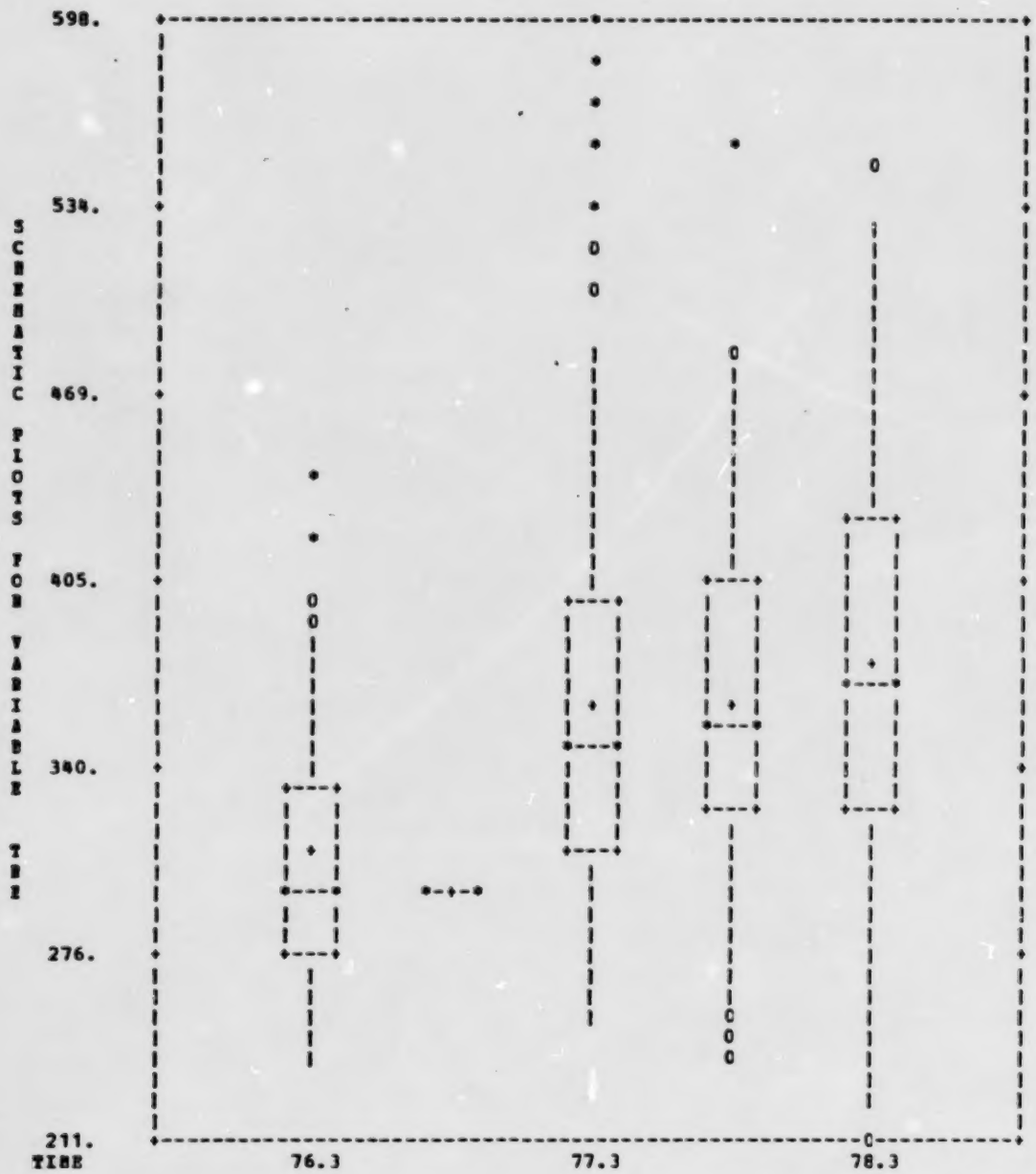
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 1
COHORT=3 BTGC=0



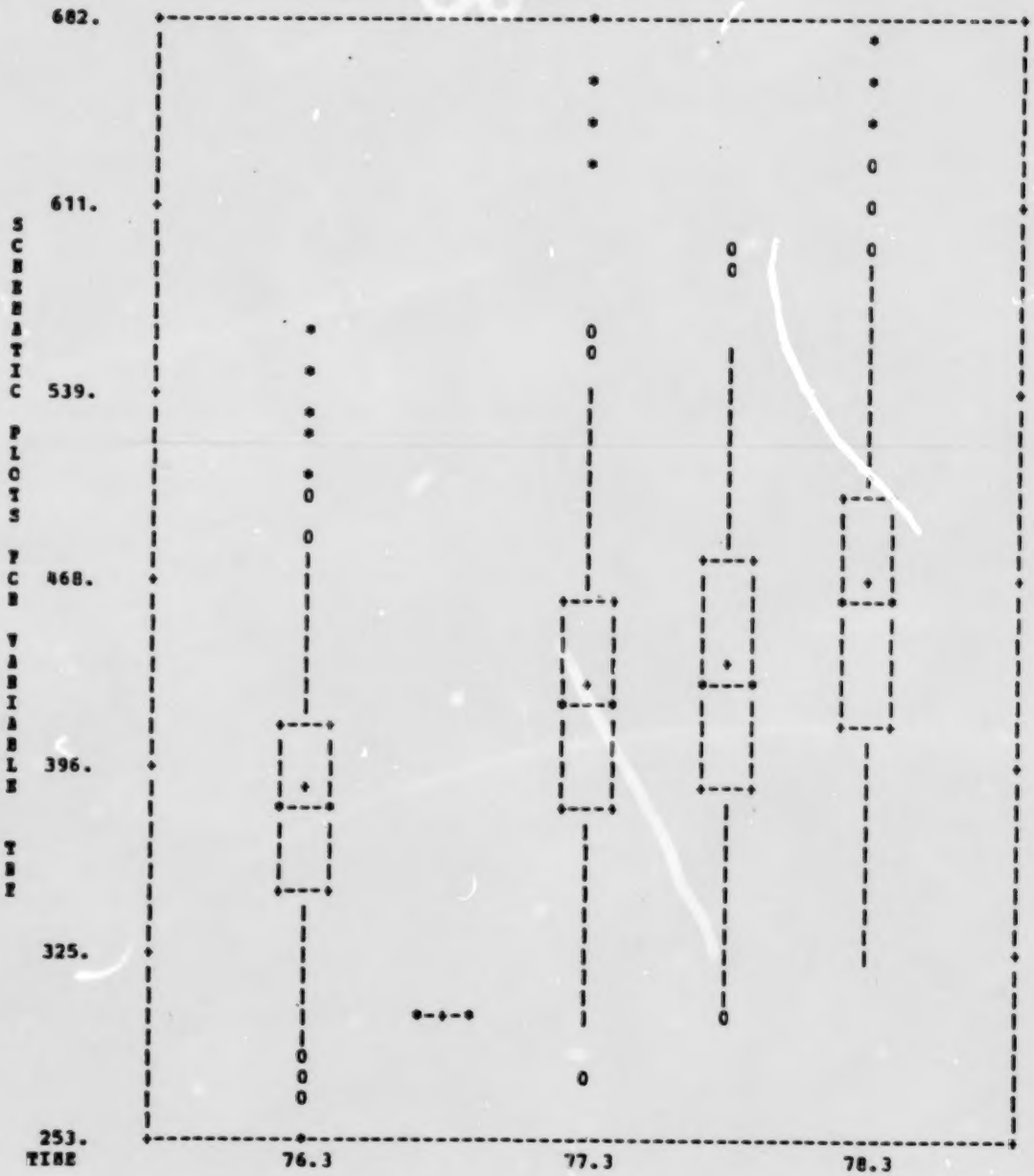
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 2
COHORT=3 BYGC=1



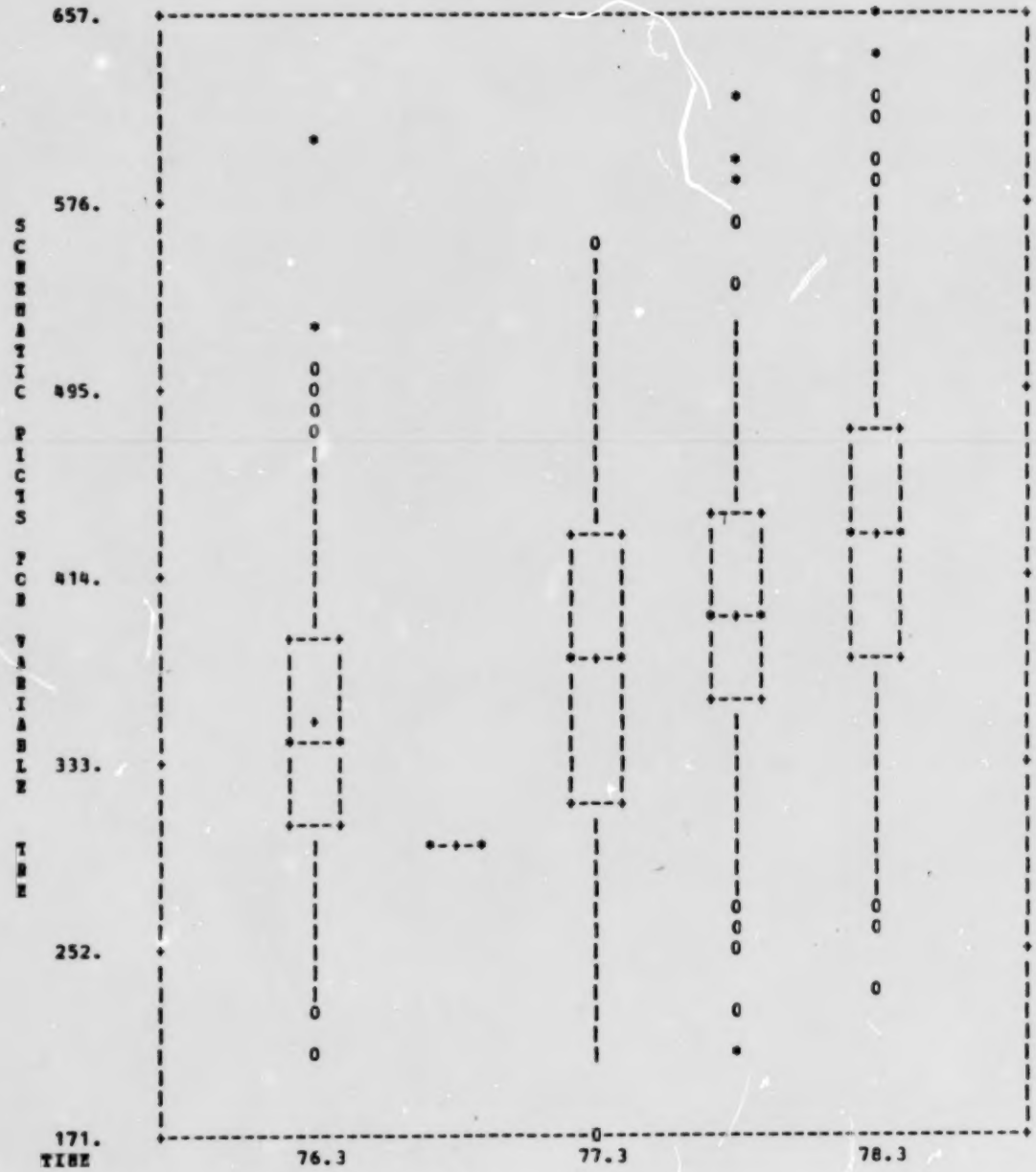
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 3
COHORT=3 BIGC=2



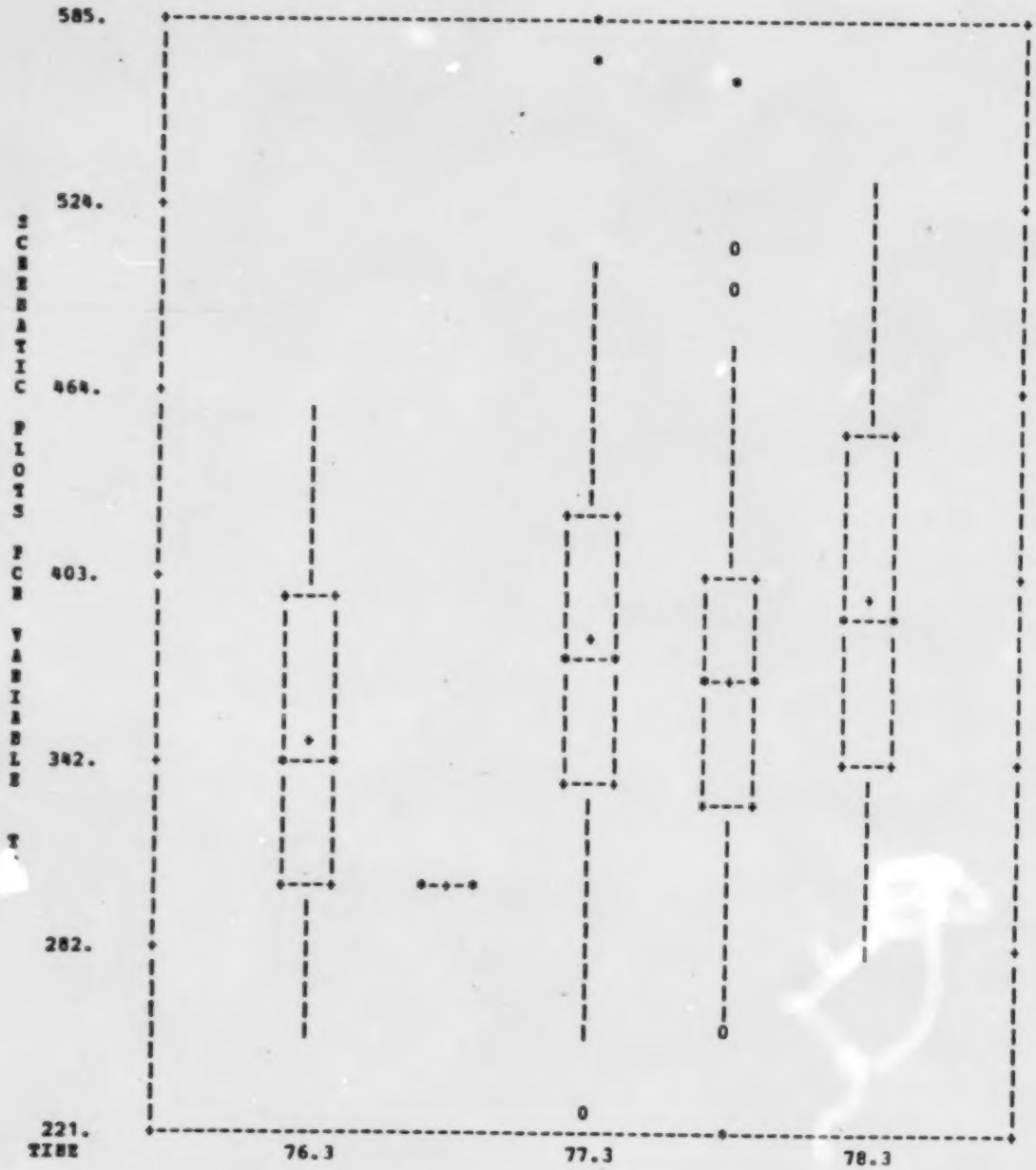
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 4
COHORT=4 BIGC=0



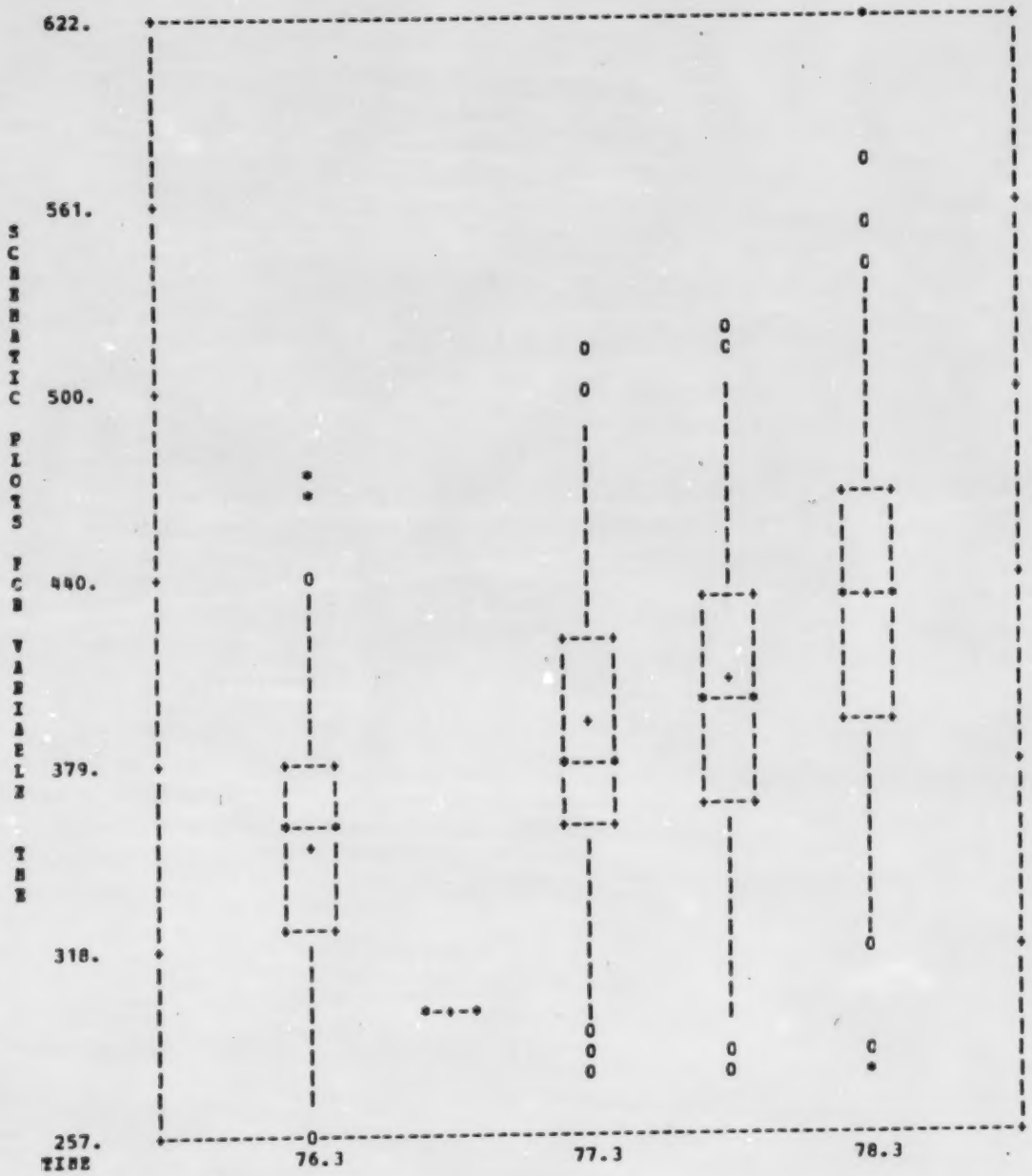
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 5
COHORT=4 PTGC=1



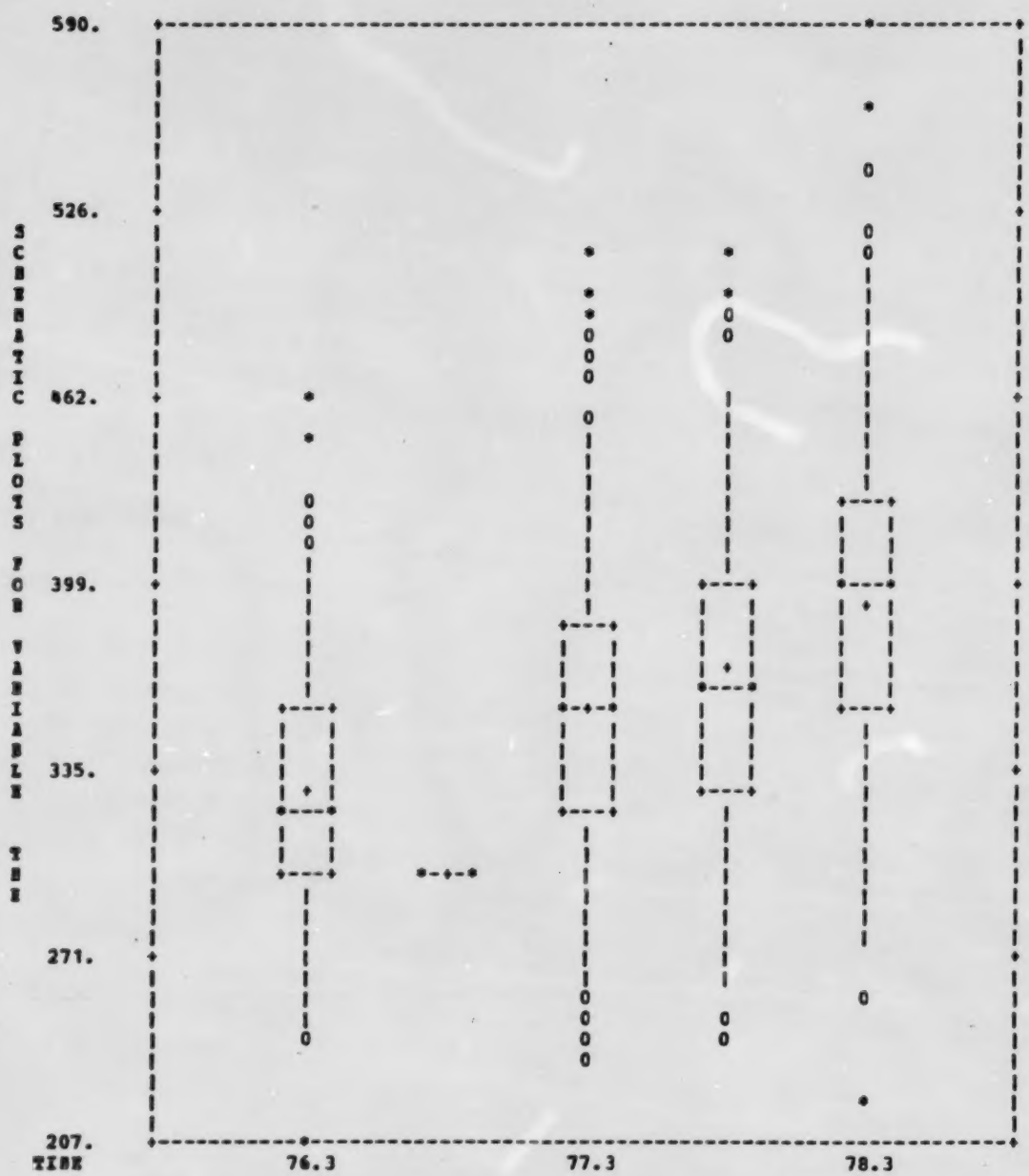
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 6
COHORT=4 ETGC=2



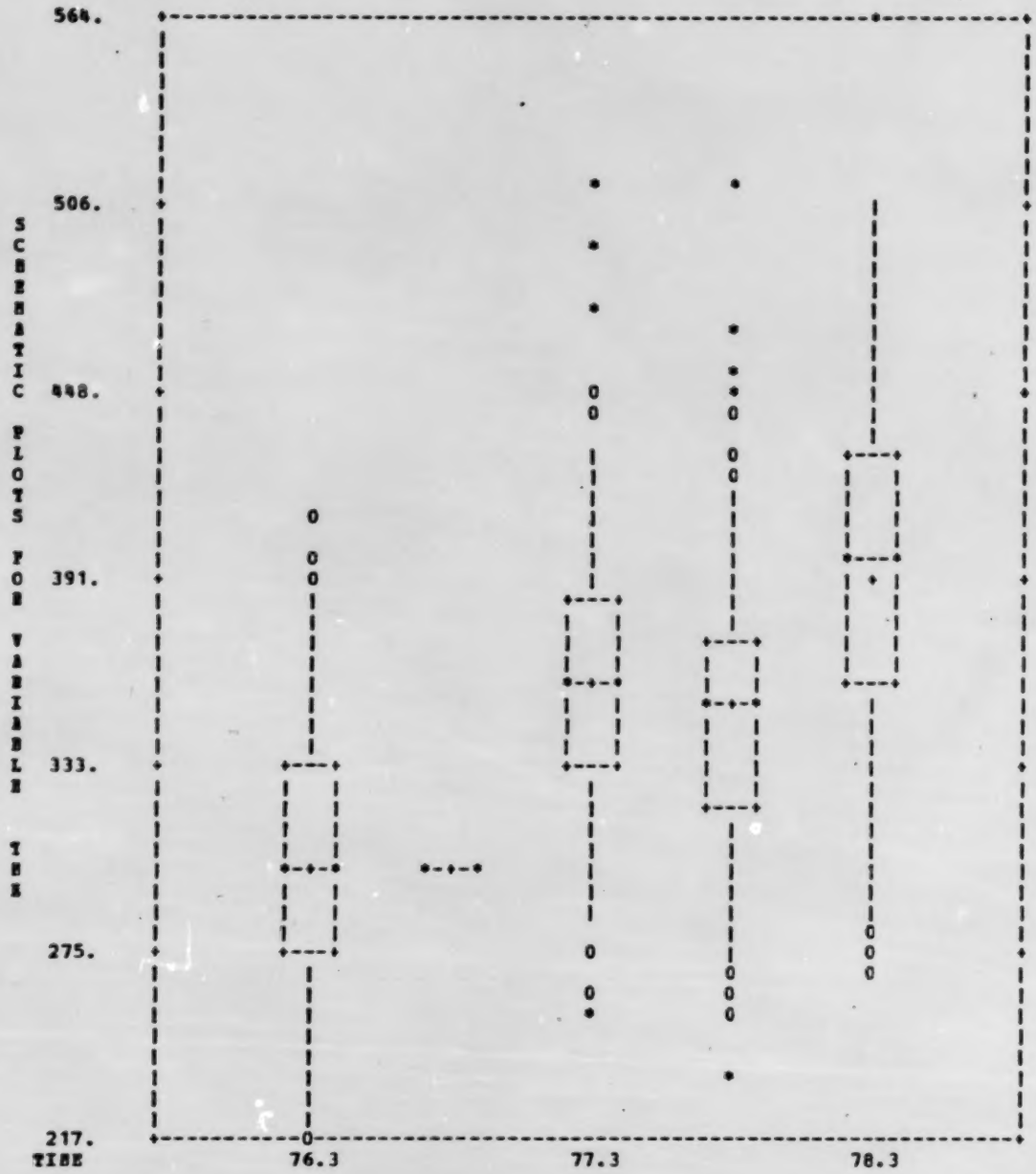
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 7
COHORT=3 BTGC=0



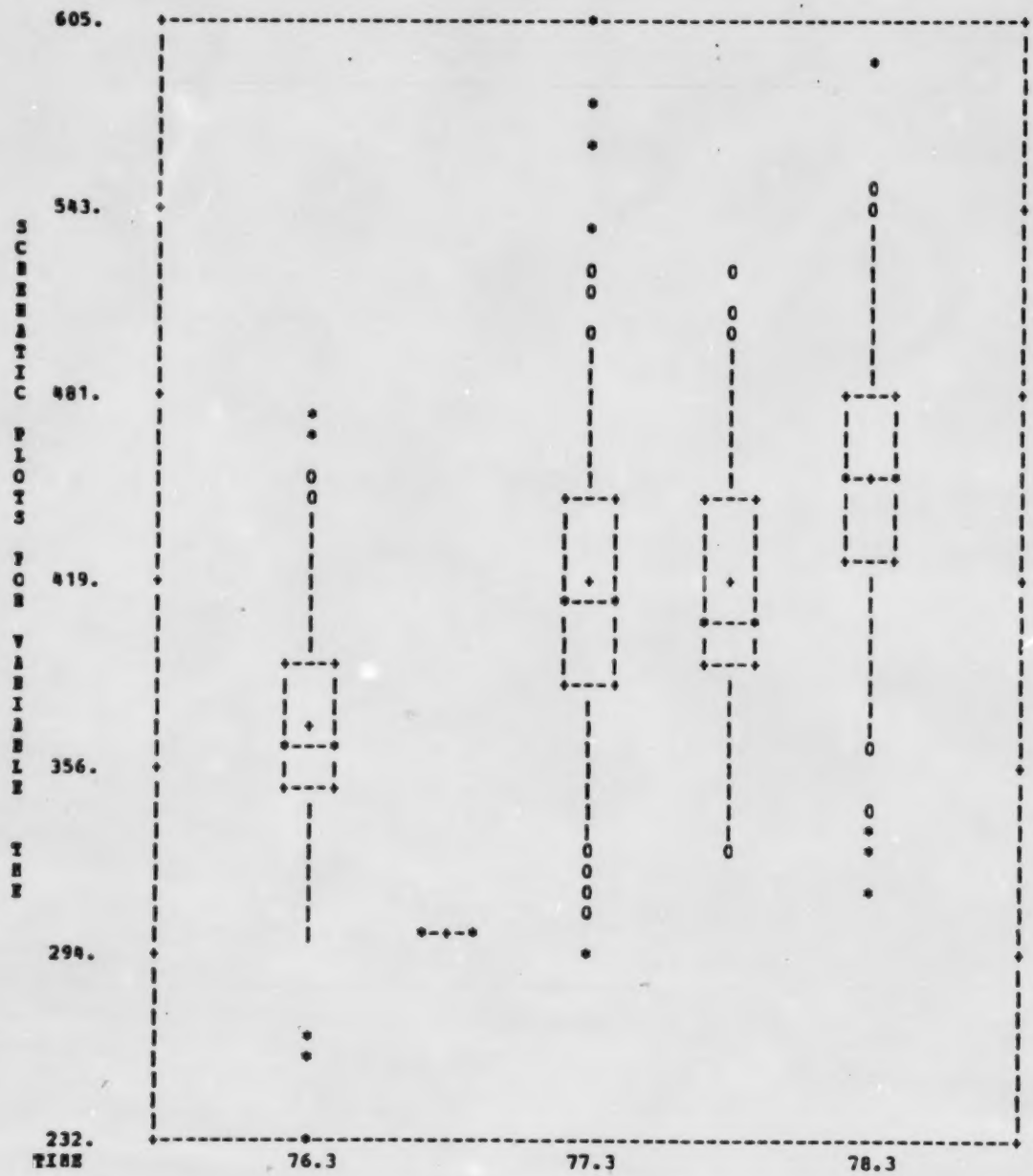
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (THE) BY TIME 8
COHORT=3 BIGC=1



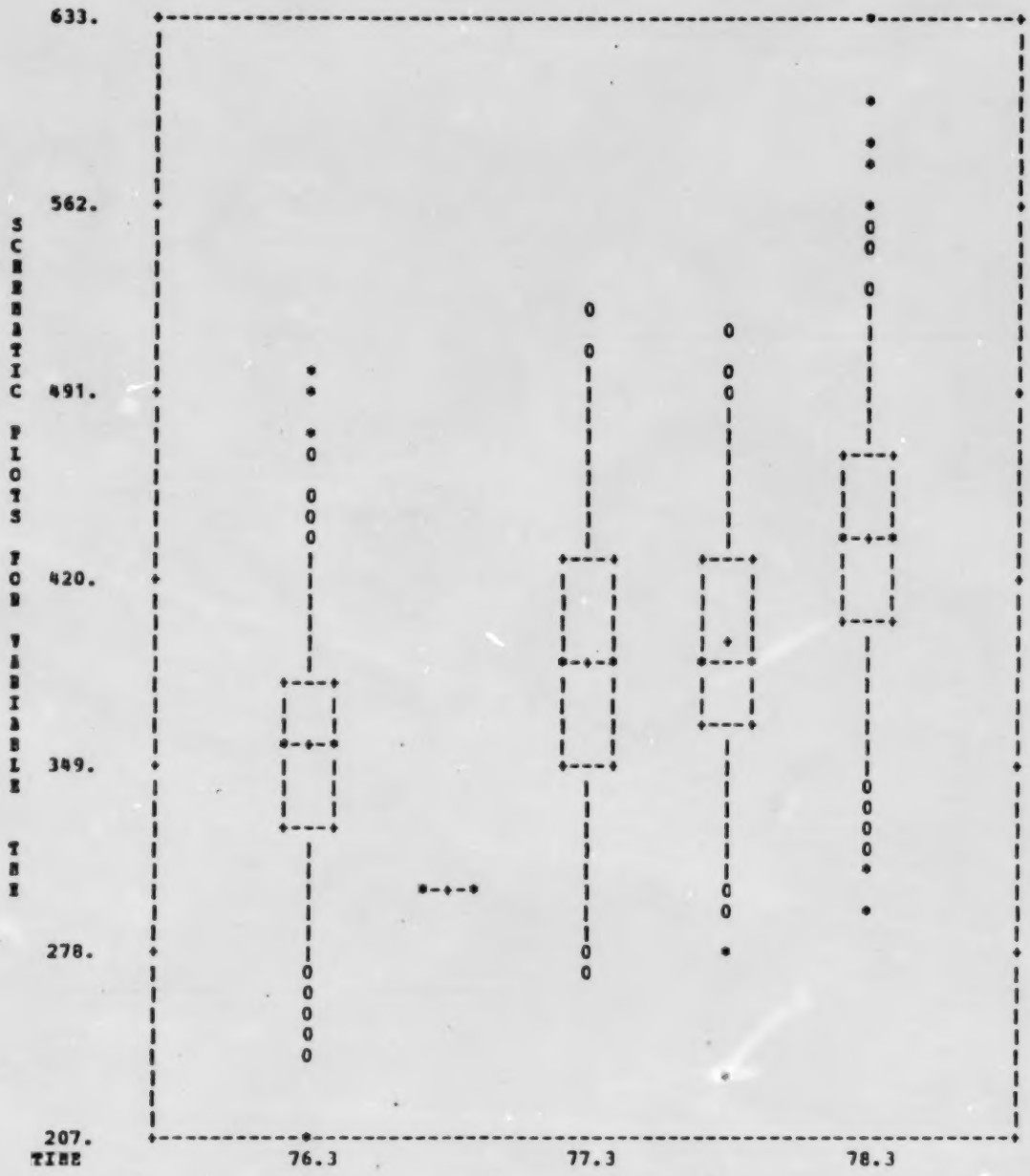
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 9
COHORT=3 BYGC=2



SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 10
CONCBT=4 BTGC=0



SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 11
COHORT=4 BTGC=1



SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 12
COHORT=4 BIGC=2

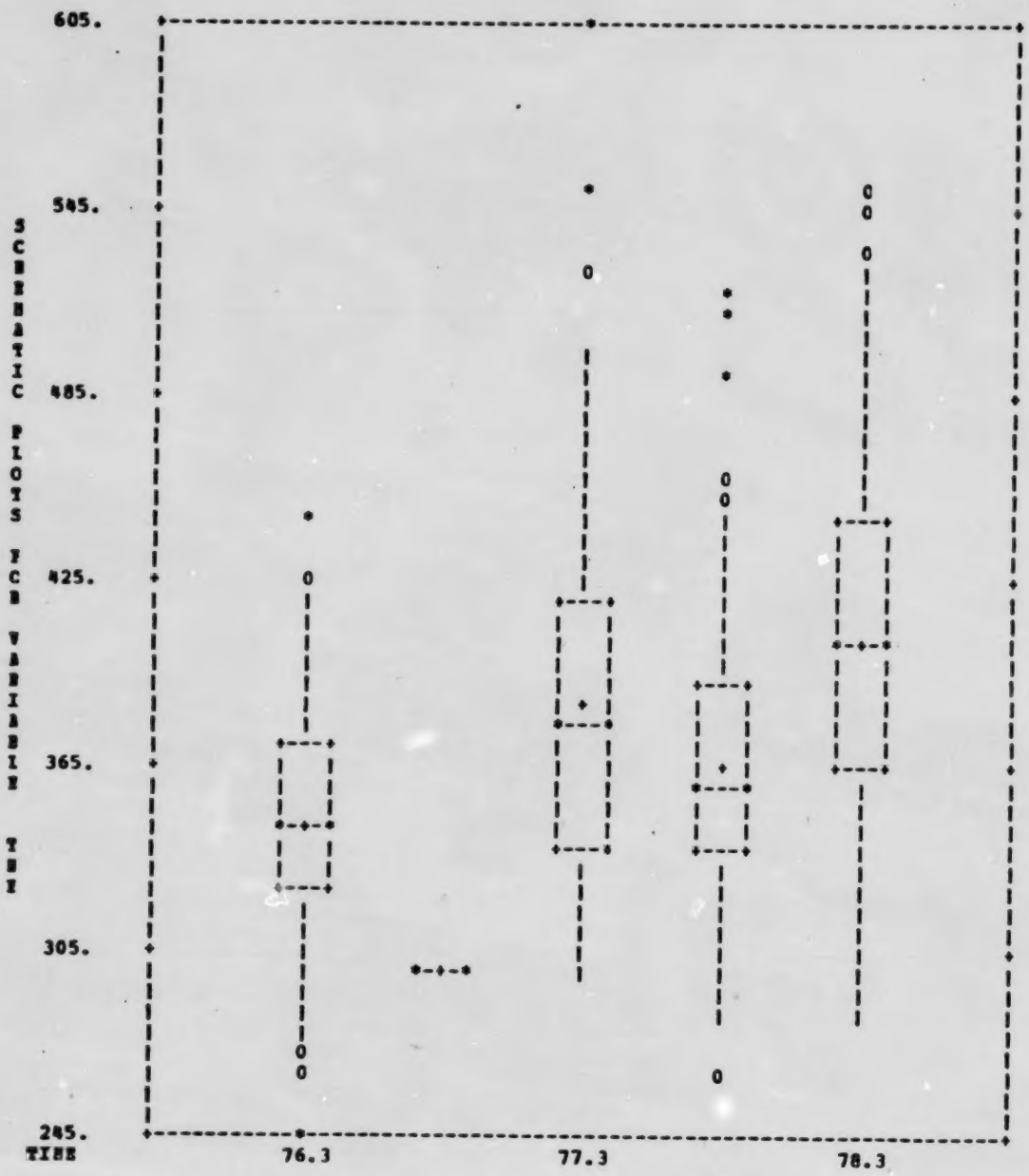


TABLE III A

(Pages 48-65)

DISTRIBUTION SUMMARY STATISTICS FOR TOTAL READING EXPANDED STANDARD SCORES (TRE), TOTAL MATHEMATICS EXPANDED STANDARD SCORES (TME) AND COMPONENT SUBTESTS FOR EACH SCHOOL IN EACH TREATMENT GROUP IN EACH COHORT

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 302

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| TOTAL READING | | | | | | | |
| 1976.3 | 31 | 395.1613 | 67.1188 | 298 | 549 | 0.6942 | -0.3639 |
| 1977.3 | 31 | 453.7419 | 91.7827 | 280 | 609 | 0.2714 | -1.0082 |
| 1977.8 | 31 | 462.2258 | 84.1985 | 270 | 609 | 0.0514 | -0.5940 |
| 1978.3 | 31 | 461.9677 | 77.6125 | 310 | 660 | 0.4757 | -0.0379 |
| READ VOCAB | | | | | | | |
| 1976.3 | 31 | 394.0000 | 68.2823 | 288 | 515 | 0.3360 | -0.8601 |
| 1977.3 | 31 | 453.5161 | 89.5797 | 307 | 590 | 0.0734 | -1.3489 |
| 1977.8 | 31 | 462.9677 | 80.3171 | 284 | 590 | 0.0399 | -0.7282 |
| 1978.3 | 31 | 469.2903 | 89.5657 | 296 | 633 | 0.3333 | -0.8265 |
| READ COMP | | | | | | | |
| 1976.3 | 31 | 412.1613 | 73.2835 | 304 | 571 | 0.3640 | -0.5125 |
| 1977.3 | 31 | 463.4516 | 84.0432 | 272 | 602 | -0.0039 | -0.2890 |
| 1977.8 | 31 | 470.8065 | 84.6748 | 283 | 602 | -0.4386 | -0.1284 |
| 1978.3 | 31 | 471.6452 | 75.7199 | 354 | 679 | 0.5882 | 0.4092 |
| TOTAL MATH | | | | | | | |
| 1976.3 | 31 | 365.7419 | 40.3724 | 290 | 464 | 0.2028 | 0.2468 |
| 1977.3 | 31 | 411.0645 | 49.4974 | 352 | 511 | 0.8257 | -0.5704 |
| 1977.8 | 31 | 425.6129 | 54.9725 | 329 | 520 | 0.2426 | -1.1396 |
| 1978.3 | 31 | 450.4516 | 48.8555 | 345 | 575 | 0.2941 | 0.4336 |
| MATH COMPUT | | | | | | | |
| 1976.3 | 31 | 373.3871 | 47.2424 | 275 | 444 | -0.2502 | -0.3536 |
| 1977.3 | 31 | 412.4516 | 35.7079 | 352 | 470 | 0.0892 | -1.1786 |
| 1977.8 | 31 | 417.2903 | 36.2751 | 343 | 470 | -0.2850 | -0.9505 |
| 1978.3 | 31 | 459.1290 | 43.3080 | 352 | 547 | -0.2744 | 0.0496 |
| MATH CONC | | | | | | | |
| 1976.3 | 31 | 381.5806 | 48.4925 | 296 | 494 | 0.2856 | -0.3124 |
| 1977.3 | 31 | 413.8387 | 64.1473 | 296 | 550 | 0.4413 | -0.4041 |
| 1977.8 | 31 | 444.4839 | 71.6635 | 328 | 550 | 0.0396 | -1.2570 |
| 1978.3 | 31 | 450.2581 | 61.9908 | 354 | 599 | 0.5223 | -0.0877 |
| MATH APPLIC | | | | | | | |
| 1976.3 | 31 | 369.0323 | 59.0827 | 274 | 470 | -0.0348 | -0.8411 |
| 1977.3 | 31 | 420.3548 | 73.7317 | 283 | 540 | -0.2724 | -0.8427 |
| 1977.8 | 31 | 437.0000 | 67.2523 | 298 | 540 | 0.0562 | -0.8350 |
| 1978.3 | 31 | 459.1935 | 76.0712 | 336 | 601 | 0.3434 | -0.5114 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH.= 309

| SCORES / / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 47 | 343.5106 | 52.8410 | 239 | 496 | 0.5099 | 0.1829 |
| 1977.3 | 47 | 396.7021 | 69.9266 | 260 | 597 | 0.8582 | 1.1347 |
| 1977.8 | 47 | 395.4043 | 79.8247 | 221 | 583 | 0.0248 | -0.0391 |
| 1978.3 | 47 | 407.8511 | 78.3626 | 256 | 660 | 0.1843 | 1.2947 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 47 | 346.0000 | 51.0375 | 243 | 515 | 0.5588 | 1.4739 |
| 1977.3 | 47 | 396.4681 | 66.8362 | 275 | 590 | 0.7075 | 0.6903 |
| 1977.8 | 47 | 390.7234 | 76.9529 | 230 | 590 | 0.1907 | -0.1970 |
| 1978.3 | 47 | 402.1915 | 74.2823 | 210 | 633 | 0.0376 | 1.7376 |
| **READ COMP** | | | | | | | |
| 1976.3 | 47 | 359.8936 | 63.5091 | 240 | 486 | 0.0938 | -0.4489 |
| 1977.3 | 47 | 416.3191 | 75.1176 | 272 | 602 | 0.4935 | -0.0134 |
| 1977.8 | 47 | 420.9149 | 83.2654 | 249 | 580 | -0.3509 | -0.2361 |
| 1978.3 | 47 | 428.8936 | 84.2569 | 240 | 679 | -0.0708 | 0.9184 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 47 | 347.4894 | 43.1705 | 257 | 475 | 0.0674 | 0.6806 |
| 1977.3 | 47 | 374.9149 | 45.5459 | 285 | 511 | 0.5546 | 1.1315 |
| 1977.8 | 47 | 390.6809 | 49.8978 | 274 | 511 | -0.1464 | 0.2260 |
| 1978.3 | 47 | 416.8085 | 62.1900 | 279 | 621 | 0.3216 | 2.0176 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 47 | 356.7021 | 40.7479 | 268 | 465 | 0.1280 | 0.3364 |
| 1977.3 | 47 | 381.4681 | 41.0598 | 301 | 470 | 0.5041 | -0.3390 |
| 1977.8 | 47 | 394.4468 | 44.2693 | 283 | 470 | -0.5399 | 0.1645 |
| 1978.3 | 47 | 423.4255 | 50.4354 | 293 | 528 | -0.4754 | 0.1847 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 47 | 358.8723 | 61.1842 | 225 | 536 | 0.5972 | 0.8069 |
| 1977.3 | 47 | 389.7021 | 64.5523 | 217 | 518 | -0.2526 | 0.1302 |
| 1977.8 | 47 | 406.8723 | 63.2709 | 296 | 550 | -0.0538 | -0.4434 |
| 1978.3 | 47 | 424.2128 | 85.7121 | 216 | 677 | 0.3551 | 1.3853 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 47 | 347.4255 | 59.6715 | 212 | 501 | -0.2943 | 0.4008 |
| 1977.3 | 47 | 375.6383 | 67.6511 | 207 | 540 | -0.1567 | 0.2922 |
| 1977.8 | 47 | 395.7447 | 68.0698 | 185 | 540 | -0.5087 | 0.7521 |
| 1978.3 | 47 | 420.2128 | 76.8827 | 273 | 645 | 0.6734 | 1.5516 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 320

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 10 | 370.9000 | 50.9279 | 288 | 449 | -0.4791 | -0.2370 |
| 1977.3 | 10 | 400.6000 | 116.4333 | 213 | 609 | 0.2424 | 0.1494 |
| 1977.8 | 10 | 419.6000 | 69.8319 | 299 | 537 | -0.1467 | -0.0532 |
| 1978.3 | 10 | 461.3000 | 59.4494 | 381 | 563 | 0.4092 | -0.9050 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 10 | 375.9000 | 40.1427 | 329 | 437 | 0.3708 | -1.3340 |
| 1977.3 | 10 | 392.1000 | 120.4219 | 169 | 555 | -0.5814 | -0.1441 |
| 1977.8 | 10 | 416.6000 | 72.1483 | 300 | 524 | 0.2921 | -0.4891 |
| 1978.3 | 10 | 465.1000 | 62.2797 | 397 | 601 | 1.1165 | 1.4036 |
| **READ COMP** | | | | | | | |
| 1976.3 | 10 | 382.5000 | 80.8486 | 240 | 502 | -0.7716 | 0.2352 |
| 1977.3 | 10 | 425.3000 | 99.1655 | 283 | 624 | 0.7573 | 0.7355 |
| 1977.8 | 10 | 440.6000 | 75.1180 | 324 | 539 | -0.6123 | -0.7351 |
| 1978.3 | 10 | 473.6000 | 71.2931 | 377 | 602 | 0.4733 | -0.6697 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 10 | 346.3000 | 42.1454 | 298 | 429 | 0.7675 | 0.0269 |
| 1977.3 | 10 | 398.9000 | 68.8565 | 278 | 501 | -0.1994 | -0.3064 |
| 1977.8 | 10 | 401.3000 | 57.0926 | 309 | 511 | 0.1653 | 0.7555 |
| 1978.3 | 10 | 432.2000 | 62.3000 | 340 | 542 | 0.1511 | -0.4581 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 10 | 344.8000 | 35.8850 | 291 | 404 | 0.0659 | -0.9699 |
| 1977.3 | 10 | 388.0000 | 53.1685 | 289 | 457 | -0.6579 | -0.0237 |
| 1977.8 | 10 | 384.1000 | 48.4870 | 283 | 457 | -0.9087 | 1.3091 |
| 1978.3 | 10 | 429.1000 | 65.3086 | 323 | 547 | 0.0630 | 0.0000 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 10 | 371.2000 | 55.9857 | 305 | 465 | 0.8413 | -0.1172 |
| 1977.3 | 10 | 438.2000 | 72.8740 | 284 | 518 | -1.2378 | 1.0271 |
| 1977.8 | 10 | 447.3000 | 71.4610 | 318 | 550 | -0.3936 | -0.1620 |
| 1978.3 | 10 | 451.5000 | 70.9777 | 354 | 569 | 0.4133 | -0.9877 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 10 | 349.6000 | 71.7731 | 235 | 470 | 0.1180 | -0.5493 |
| 1977.3 | 10 | 409.6000 | 90.1532 | 298 | 540 | 0.2445 | -1.3114 |
| 1977.8 | 10 | 428.3000 | 63.6502 | 346 | 540 | 0.4490 | -0.7285 |
| 1978.3 | 10 | 442.1000 | 83.2859 | 248 | 521 | -1.6418 | 2.7604 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 322

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 60 | 298.1833 | 38.3461 | 239 | 419 | 1.1347 | 1.3820 |
| 1977.3 | 60 | 370.4833 | 91.4922 | 254 | 597 | 1.0318 | -0.0511 |
| 1977.8 | 60 | 359.5000 | 55.0868 | 248 | 553 | 0.9276 | 1.6287 |
| 1978.3 | 60 | 353.0167 | 63.0721 | 211 | 546 | 0.8612 | 0.8465 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 60 | 304.8167 | 36.8770 | 229 | 402 | 0.5064 | 0.1459 |
| 1977.3 | 60 | 374.9000 | 99.4532 | 243 | 590 | 0.9098 | -0.2219 |
| 1977.8 | 60 | 359.8000 | 56.6885 | 265 | 497 | 0.6925 | -0.2799 |
| 1978.3 | 60 | 367.2000 | 60.1633 | 210 | 528 | 0.4899 | 0.7370 |
| **READ COMP** | | | | | | | |
| 1976.3 | 60 | 312.2167 | 49.7175 | 192 | 462 | 0.6072 | 1.1029 |
| 1977.3 | 60 | 385.5500 | 84.1241 | 249 | 580 | 0.8691 | -0.2484 |
| 1977.8 | 60 | 380.3500 | 61.7518 | 237 | 602 | 0.7827 | 2.1322 |
| 1978.3 | 60 | 359.3000 | 70.7129 | 208 | 584 | 0.7407 | 0.7240 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 60 | 286.9667 | 35.7169 | 217 | 399 | 0.6762 | 0.6180 |
| 1977.3 | 60 | 359.5667 | 60.2701 | 255 | 511 | 0.8104 | 0.1940 |
| 1977.8 | 60 | 338.9500 | 54.5904 | 237 | 511 | 0.8479 | 0.9757 |
| 1978.3 | 60 | 361.7833 | 58.5387 | 268 | 563 | 0.9064 | 1.3030 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 60 | 298.2333 | 31.6289 | 207 | 384 | 0.3475 | 0.8730 |
| 1977.3 | 60 | 361.3500 | 46.1144 | 269 | 470 | 0.5081 | -0.1795 |
| 1977.8 | 60 | 353.5833 | 45.6257 | 252 | 470 | 0.6449 | 0.5324 |
| 1978.3 | 60 | 376.7833 | 51.1280 | 270 | 528 | 0.4769 | 0.4785 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 60 | 295.8000 | 42.0528 | 201 | 410 | 0.3309 | 0.0850 |
| 1977.3 | 60 | 380.3500 | 79.6569 | 254 | 550 | 0.6083 | -0.4260 |
| 1977.8 | 60 | 337.3667 | 74.9321 | 217 | 550 | 0.7077 | 0.0445 |
| 1978.3 | 60 | 361.8667 | 72.9375 | 261 | 599 | 0.9620 | 0.9321 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 60 | 298.6167 | 53.3778 | 157 | 470 | 0.2350 | 1.4407 |
| 1977.3 | 60 | 353.9000 | 82.1888 | 207 | 540 | 0.6462 | -0.1583 |
| 1977.8 | 60 | 330.0000 | 68.5783 | 185 | 540 | 0.9159 | 1.4409 |
| 1978.3 | 60 | 371.0167 | 69.1519 | 194 | 568 | 0.4986 | 1.4057 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 334

| SCORES / / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 15 | 292.2667 | 33.3434 | 246 | 371 | 1.0724 | 1.0320 |
| 1977.3 | 15 | 306.3333 | 30.4740 | 265 | 358 | 0.1236 | -1.3783 |
| 1977.8 | 15 | 324.4667 | 31.7892 | 280 | 377 | 0.0858 | -1.3185 |
| 1978.3 | 15 | 328.7333 | 49.9421 | 273 | 486 | 2.3785 | 7.3324 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 15 | 293.2667 | 30.9919 | 243 | 361 | 0.3559 | 0.3511 |
| 1977.3 | 15 | 303.2000 | 33.2828 | 255 | 384 | 0.9318 | 1.1304 |
| 1977.8 | 15 | 315.8000 | 33.3856 | 265 | 372 | 0.2100 | -1.2484 |
| 1978.3 | 15 | 327.5333 | 46.3725 | 266 | 447 | 1.1767 | 1.8868 |
| **READ COMP** | | | | | | | |
| 1976.3 | 15 | 314.0000 | 43.4232 | 255 | 397 | 0.3231 | -0.7807 |
| 1977.3 | 15 | 332.8667 | 36.4807 | 261 | 408 | 0.0469 | 0.5141 |
| 1977.8 | 15 | 355.4000 | 38.1553 | 283 | 413 | -0.2560 | -0.8682 |
| 1978.3 | 15 | 357.3333 | 62.9179 | 286 | 553 | 2.2814 | 6.8642 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 15 | 304.2000 | 38.0530 | 207 | 375 | -0.8425 | 2.5605 |
| 1977.3 | 15 | 325.6000 | 38.0410 | 267 | 387 | -0.2633 | -1.0302 |
| 1977.8 | 15 | 344.0667 | 37.2778 | 274 | 399 | -0.6485 | -0.4459 |
| 1978.3 | 15 | 363.6000 | 42.1762 | 285 | 442 | 0.0432 | -0.2971 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 15 | 315.0000 | 34.2136 | 254 | 414 | 1.5300 | 5.1852 |
| 1977.3 | 15 | 345.8000 | 37.6358 | 269 | 397 | -0.5751 | -0.2861 |
| 1977.8 | 15 | 365.9333 | 40.1328 | 269 | 416 | -1.0539 | 0.9114 |
| 1978.3 | 15 | 389.2667 | 48.3077 | 293 | 458 | -0.1457 | -0.6380 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 15 | 306.8000 | 46.0531 | 201 | 353 | -1.3134 | 0.8040 |
| 1977.3 | 15 | 318.4667 | 35.7369 | 270 | 384 | 0.5447 | -0.5326 |
| 1977.8 | 15 | 331.5333 | 42.1000 | 254 | 396 | -0.4769 | -0.5330 |
| 1978.3 | 15 | 352.1333 | 34.1987 | 281 | 399 | -0.3812 | 0.0453 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 15 | 318.0667 | 47.4845 | 187 | 376 | -1.3645 | 3.2849 |
| 1977.3 | 15 | 299.4000 | 57.5237 | 228 | 408 | 0.6485 | -0.8484 |
| 1977.8 | 15 | 319.6000 | 53.9547 | 228 | 408 | -0.2907 | -0.6869 |
| 1978.3 | 15 | 345.5333 | 52.8757 | 248 | 461 | 0.3023 | 0.7552 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 344

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 96 | 343.0104 | 66.0375 | 217 | 533 | 0.5983 | -0.1380 |
| 1977.3 | 96 | 371.7396 | 79.8946 | 221 | 583 | 0.6957 | -0.0160 |
| 1977.8 | 96 | 398.8021 | 77.5973 | 254 | 568 | 0.4979 | -0.4334 |
| 1978.3 | 96 | 419.3646 | 77.7880 | 281 | 625 | 0.4473 | -0.1375 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 96 | 340.5208 | 65.9513 | 214 | 538 | 0.6057 | 0.3587 |
| 1977.3 | 96 | 363.1979 | 72.4860 | 199 | 555 | 0.5155 | -0.1260 |
| 1977.8 | 96 | 388.5104 | 71.0605 | 265 | 555 | 0.6162 | -0.2793 |
| 1978.3 | 96 | 421.2188 | 81.0284 | 282 | 633 | 0.4651 | 0.0406 |
| **READ COMP** | | | | | | | |
| 1976.3 | 96 | 366.0000 | 78.3036 | 174 | 521 | 0.2903 | -0.3331 |
| 1977.3 | 96 | 397.8750 | 83.9375 | 237 | 602 | 0.5439 | -0.1813 |
| 1977.8 | 96 | 425.2813 | 82.2049 | 261 | 602 | 0.2902 | -0.3967 |
| 1978.3 | 96 | 432.5729 | 79.1016 | 286 | 650 | 0.4812 | -0.0747 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 96 | 344.8229 | 46.0066 | 253 | 464 | 0.2925 | -0.0752 |
| 1977.3 | 96 | 382.2188 | 51.8470 | 251 | 511 | 0.2446 | 0.2041 |
| 1977.8 | 96 | 391.9375 | 54.9895 | 281 | 511 | 0.2703 | -0.5427 |
| 1978.3 | 96 | 416.7813 | 54.9387 | 312 | 589 | 0.6154 | 0.4806 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 96 | 360.9688 | 48.4888 | 268 | 465 | 0.4731 | -0.3753 |
| 1977.3 | 96 | 393.3333 | 46.1667 | 269 | 470 | -0.3003 | -0.5553 |
| 1977.8 | 96 | 396.4896 | 46.1719 | 294 | 470 | -0.1564 | -0.9632 |
| 1978.3 | 96 | 424.8021 | 49.1926 | 323 | 547 | 0.0288 | -0.3460 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 96 | 349.4896 | 56.5836 | 225 | 536 | 0.6323 | 0.5247 |
| 1977.3 | 96 | 390.1875 | 63.4546 | 217 | 550 | 0.0248 | 0.0229 |
| 1977.8 | 96 | 407.7083 | 68.4862 | 195 | 550 | -0.2013 | 0.0451 |
| 1978.3 | 96 | 420.5313 | 72.2628 | 261 | 599 | 0.4794 | 0.2507 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 96 | 337.4271 | 66.6034 | 187 | 548 | 0.2740 | 1.0227 |
| 1977.3 | 96 | 375.6354 | 73.3705 | 228 | 540 | 0.3783 | -0.1393 |
| 1977.8 | 96 | 391.0000 | 71.8879 | 266 | 540 | 0.4196 | -0.4286 |
| 1978.3 | 96 | 415.7500 | 72.6937 | 248 | 601 | 0.2943 | 0.0428 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 379

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 98 | 322.2755 | 51.3490 | 232 | 549 | 1.1788 | 2.9120 |
| 1977.3 | 98 | 338.0102 | 50.5527 | 221 | 484 | 0.1325 | -0.3843 |
| 1977.8 | 98 | 339.2959 | 54.4406 | 229 | 509 | 0.2418 | -0.0343 |
| 1978.3 | 98 | 354.1327 | 56.8165 | 211 | 486 | -0.0623 | 0.0301 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 98 | 318.1020 | 50.9189 | 243 | 496 | 1.1888 | 1.5219 |
| 1977.3 | 98 | 340.8265 | 51.2268 | 243 | 497 | 0.5836 | 0.1065 |
| 1977.8 | 98 | 332.5510 | 55.1142 | 215 | 497 | 0.4443 | -0.0678 |
| 1978.3 | 98 | 356.6939 | 56.2479 | 230 | 490 | -0.1093 | -0.0450 |
| **READ COMP** | | | | | | | |
| 1976.3 | 98 | 346.0204 | 58.8472 | 255 | 603 | 1.1067 | 2.5899 |
| 1977.3 | 98 | 356.6531 | 57.5548 | 224 | 489 | -0.2601 | -0.6182 |
| 1977.8 | 98 | 368.8265 | 58.5845 | 209 | 580 | 0.1117 | 1.0430 |
| 1978.3 | 98 | 372.9082 | 60.8134 | 240 | 520 | 0.0320 | -0.4666 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 98 | 314.5102 | 37.6890 | 240 | 464 | 0.7696 | 1.6283 |
| 1977.3 | 98 | 334.7857 | 44.8997 | 232 | 432 | -0.3425 | -0.6243 |
| 1977.8 | 98 | 346.9388 | 46.0470 | 242 | 458 | -0.0100 | -0.3200 |
| 1978.3 | 98 | 376.1224 | 50.2052 | 224 | 488 | -0.4210 | 0.0241 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 98 | 326.0306 | 38.6857 | 254 | 465 | 0.6494 | 0.9386 |
| 1977.3 | 98 | 348.8469 | 47.1478 | 252 | 470 | -0.0708 | -0.3280 |
| 1977.8 | 98 | 359.6429 | 44.9800 | 241 | 457 | -0.1569 | -0.2417 |
| 1978.3 | 98 | 399.1633 | 53.1545 | 254 | 513 | -0.4730 | 0.1943 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 98 | 326.1531 | 42.7735 | 225 | 465 | 0.5606 | 0.7111 |
| 1977.3 | 98 | 339.7551 | 50.7405 | 236 | 469 | 0.0017 | -0.6089 |
| 1977.8 | 98 | 352.3571 | 53.2507 | 236 | 469 | 0.0178 | -0.5844 |
| 1978.3 | 98 | 366.9184 | 58.9520 | 216 | 501 | 0.1266 | -0.1820 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 98 | 303.8980 | 51.7017 | 157 | 470 | 0.3213 | 1.5437 |
| 1977.3 | 98 | 328.7347 | 56.9213 | 207 | 476 | 0.0307 | -0.6865 |
| 1977.8 | 98 | 336.0612 | 65.8840 | 185 | 503 | -0.0506 | -0.1805 |
| 1978.3 | 98 | 361.6531 | 60.3919 | 194 | 505 | -0.4158 | 0.3009 |

DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 382

| SCORES / / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| TOTAL READING | | | | | | | |
| 1976.3 | 33 | 325.0000 | 36.0069 | 266 | 395 | 0.2030 | -1.0521 |
| 1977.3 | 33 | 374.1515 | 54.2092 | 275 | 553 | 0.9428 | 2.5740 |
| 1977.8 | 33 | 370.5455 | 46.4765 | 270 | 464 | -0.0927 | -0.3743 |
| 1978.3 | 33 | 383.3030 | 54.7149 | 296 | 493 | 0.1241 | -0.5513 |
| READ VOCAB | | | | | | | |
| 1976.3 | 33 | 319.8788 | 37.4172 | 243 | 373 | -0.3159 | -0.8204 |
| 1977.3 | 33 | 377.6667 | 67.5156 | 300 | 555 | 1.3650 | 1.6293 |
| 1977.8 | 33 | 365.0909 | 38.0677 | 275 | 456 | 0.0353 | 0.7238 |
| 1978.3 | 33 | 378.2121 | 58.7515 | 210 | 490 | -0.4552 | 0.8315 |
| READ COMP | | | | | | | |
| 1976.3 | 33 | 348.7576 | 41.2447 | 281 | 432 | 0.1770 | -1.2207 |
| 1977.3 | 33 | 394.4848 | 55.0784 | 237 | 539 | -0.2612 | 1.8146 |
| 1977.8 | 33 | 392.6364 | 68.6508 | 261 | 559 | -0.0925 | 0.0956 |
| 1978.3 | 33 | 404.7879 | 62.4358 | 271 | 541 | -0.2507 | 0.1163 |
| TOTAL MATH | | | | | | | |
| 1976.3 | 33 | 330.1212 | 31.5295 | 267 | 390 | -0.1156 | -0.7887 |
| 1977.3 | 33 | 364.4242 | 31.3469 | 302 | 451 | 0.5380 | 1.1665 |
| 1977.8 | 33 | 363.7273 | 31.7994 | 315 | 466 | 1.0854 | 2.0646 |
| 1978.3 | 33 | 406.4242 | 36.5026 | 306 | 498 | -0.1427 | 1.2420 |
| MATH COMPUT | | | | | | | |
| 1976.3 | 33 | 341.2727 | 30.8588 | 286 | 428 | 0.3970 | 0.5233 |
| 1977.3 | 33 | 363.9394 | 31.0140 | 299 | 445 | 0.4560 | 0.5418 |
| 1977.8 | 33 | 368.8788 | 31.9656 | 314 | 470 | 0.8049 | 1.6622 |
| 1978.3 | 33 | 416.6667 | 36.5468 | 323 | 479 | -0.3171 | -0.0116 |
| MATH CONC | | | | | | | |
| 1976.3 | 33 | 340.2424 | 38.8829 | 274 | 443 | 0.7653 | 0.8987 |
| 1977.3 | 33 | 389.6061 | 41.1210 | 318 | 469 | 0.0544 | -0.9049 |
| 1977.8 | 33 | 380.0000 | 54.2886 | 296 | 518 | 0.6170 | -0.0300 |
| 1978.3 | 33 | 400.3636 | 46.1396 | 301 | 521 | 0.1229 | 0.4669 |
| MATH APPLIC | | | | | | | |
| 1976.3 | 33 | 317.2121 | 55.2204 | 157 | 399 | -0.8865 | 1.0482 |
| 1977.3 | 33 | 372.0000 | 49.1795 | 248 | 476 | -0.2117 | 0.3137 |
| 1977.8 | 33 | 357.2727 | 56.6416 | 207 | 456 | -0.7613 | 0.4370 |
| 1978.3 | 33 | 411.2424 | 45.9273 | 336 | 542 | 0.6319 | 0.4781 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 3 NOSCH = 395

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 32 | 312.0625 | 52.1975 | 239 | 439 | 0.5803 | -0.3178 |
| 1977.3 | 32 | 345.5313 | 44.4377 | 280 | 464 | 0.6522 | 0.1061 |
| 1977.8 | 32 | 360.9375 | 58.9729 | 242 | 473 | -0.1368 | -0.4703 |
| 1978.3 | 32 | 411.0938 | 62.8276 | 248 | 501 | -0.6511 | 0.1294 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 32 | 312.8125 | 48.1861 | 243 | 437 | 0.7661 | 0.2095 |
| 1977.3 | 32 | 342.7188 | 46.5127 | 243 | 456 | 0.2844 | -0.0893 |
| 1977.8 | 32 | 361.6250 | 50.3560 | 265 | 475 | 0.2431 | -0.4397 |
| 1978.3 | 32 | 421.2813 | 75.6628 | 266 | 577 | -0.0832 | -0.0492 |
| **READ COMP** | | | | | | | |
| 1976.3 | 32 | 333.1563 | 58.0145 | 240 | 462 | 0.5903 | -0.4205 |
| 1977.3 | 32 | 369.0625 | 48.3775 | 272 | 489 | 0.3513 | 0.1741 |
| 1977.8 | 32 | 379.0938 | 73.7504 | 192 | 521 | -0.5289 | 0.4586 |
| 1978.3 | 32 | 418.6563 | 61.9800 | 271 | 541 | -0.4046 | -0.2602 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 32 | 300.9688 | 36.5023 | 232 | 412 | 0.8291 | 1.5456 |
| 1977.3 | 32 | 361.0938 | 39.8589 | 263 | 474 | 0.1390 | 1.7599 |
| 1977.8 | 32 | 356.2813 | 32.4974 | 289 | 427 | 0.2121 | 0.2383 |
| 1978.3 | 32 | 429.7188 | 30.5162 | 373 | 493 | 0.0541 | -0.1779 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 32 | 301.2188 | 30.1616 | 228 | 396 | 0.5284 | 2.5259 |
| 1977.3 | 32 | 368.6875 | 35.1847 | 299 | 445 | 0.0878 | -0.4525 |
| 1977.8 | 32 | 366.7500 | 35.3918 | 289 | 445 | 0.2598 | 0.0203 |
| 1978.3 | 32 | 429.0313 | 40.7284 | 352 | 569 | 1.2833 | 3.8442 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 32 | 331.1250 | 44.7839 | 261 | 443 | 1.1334 | 0.6064 |
| 1977.3 | 32 | 370.4375 | 49.3022 | 236 | 491 | -0.0919 | 1.6365 |
| 1977.8 | 32 | 381.7813 | 51.3154 | 307 | 491 | 0.4436 | -0.8333 |
| 1978.3 | 32 | 465.9063 | 56.4174 | 354 | 599 | 0.2778 | 0.4290 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 32 | 310.7500 | 61.5588 | 187 | 448 | 0.0754 | 0.2383 |
| 1977.3 | 32 | 360.1563 | 54.5753 | 228 | 503 | 0.2140 | 0.7032 |
| 1977.8 | 32 | 326.6563 | 66.7686 | 185 | 456 | -0.2873 | -0.2544 |
| 1978.3 | 32 | 430.4688 | 49.8326 | 317 | 521 | -0.6382 | 0.4553 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 302

| SCORES / / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 25 | 414.8800 | 54.8804 | 328 | 549 | 1.1805 | 0.8062 |
| 1977.3 | 25 | 458.2400 | 93.8209 | 324 | 681 | 0.9199 | 0.3066 |
| 1977.8 | 25 | 444.1200 | 63.4431 | 328 | 597 | 0.4975 | 0.1512 |
| 1978.3 | 25 | 505.9600 | 77.8077 | 400 | 672 | 0.7406 | -0.2968 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 25 | 404.8000 | 64.6561 | 314 | 538 | 0.7442 | -0.1421 |
| 1977.3 | 25 | 450.8400 | 94.8282 | 296 | 673 | 0.7522 | 0.1522 |
| 1977.8 | 25 | 426.7600 | 63.1165 | 292 | 555 | 0.0272 | -0.0874 |
| 1978.3 | 25 | 528.8400 | 94.0030 | 364 | 690 | 0.1262 | -1.1763 |
| **READ COMP** | | | | | | | |
| 1976.3 | 25 | 441.5600 | 52.5112 | 362 | 571 | 1.1475 | 0.8217 |
| 1977.3 | 25 | 476.0400 | 97.4874 | 329 | 679 | 0.5862 | -0.1675 |
| 1977.8 | 25 | 478.0800 | 63.7743 | 361 | 602 | 0.1210 | -0.7239 |
| 1978.3 | 25 | 511.3600 | 76.0547 | 400 | 667 | 0.7870 | -0.1821 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 25 | 384.3600 | 39.5030 | 334 | 464 | 0.9224 | -0.1163 |
| 1977.3 | 25 | 437.4000 | 66.2659 | 331 | 604 | 0.8194 | 0.5499 |
| 1977.8 | 25 | 429.8000 | 39.0608 | 372 | 511 | 0.8083 | -0.0855 |
| 1978.3 | 25 | 479.3600 | 48.6860 | 407 | 588 | 0.4220 | -0.6391 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 25 | 386.7600 | 40.3446 | 325 | 465 | 0.3937 | -1.1467 |
| 1977.3 | 25 | 440.8400 | 60.2001 | 331 | 547 | 0.0775 | -0.4080 |
| 1977.8 | 25 | 429.4800 | 27.0048 | 381 | 470 | -0.1089 | -1.2526 |
| 1978.3 | 25 | 514.5600 | 67.7902 | 409 | 617 | 0.0058 | -1.3118 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 25 | 407.4400 | 60.2101 | 328 | 536 | 0.8375 | -0.1430 |
| 1977.3 | 25 | 439.8400 | 76.3695 | 301 | 635 | 0.4986 | 0.6901 |
| 1977.8 | 25 | 446.2000 | 52.7628 | 360 | 550 | 0.2825 | -0.6080 |
| 1978.3 | 25 | 470.0000 | 44.4560 | 399 | 544 | 0.1647 | -0.9315 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 25 | 392.3600 | 42.8280 | 326 | 470 | 0.1906 | -0.9250 |
| 1977.3 | 25 | 444.3200 | 78.7172 | 317 | 601 | 0.5347 | -0.1217 |
| 1977.8 | 25 | 442.6400 | 50.0199 | 374 | 540 | 0.7285 | -0.2455 |
| 1978.3 | 25 | 469.9600 | 66.4075 | 365 | 608 | 0.6361 | -0.1592 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 309

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 55 | 387.6909 | 58.5016 | 277 | 566 | 0.4761 | 0.4159 |
| 1977.3 | 55 | 430.0182 | 64.2217 | 303 | 660 | 0.6670 | 1.7879 |
| 1977.8 | 55 | 445.8545 | 62.1108 | 331 | 597 | 0.4983 | -0.4883 |
| 1978.3 | 55 | 463.1455 | 66.5066 | 339 | 624 | 0.5211 | -0.2451 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 55 | 384.3636 | 51.0288 | 278 | 538 | 0.3828 | 0.6144 |
| 1977.3 | 55 | 422.2727 | 64.4721 | 310 | 633 | 0.8467 | 1.0322 |
| 1977.8 | 55 | 433.3636 | 56.7745 | 320 | 590 | 0.1894 | -0.2795 |
| 1978.3 | 55 | 449.4727 | 67.9487 | 321 | 606 | 0.6874 | -0.0135 |
| **READ COMP** | | | | | | | |
| 1976.3 | 55 | 409.0909 | 74.9405 | 240 | 571 | -0.0708 | 0.0502 |
| 1977.3 | 55 | 452.8000 | 69.8947 | 315 | 679 | 0.2931 | 1.0576 |
| 1977.8 | 55 | 470.6545 | 62.5446 | 314 | 580 | 0.1972 | -0.2277 |
| 1978.3 | 55 | 491.4727 | 77.8938 | 242 | 718 | -0.0016 | 1.6365 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 55 | 374.0182 | 42.6782 | 257 | 475 | -0.1935 | 1.0296 |
| 1977.3 | 55 | 419.1818 | 51.8435 | 296 | 575 | 0.1319 | 0.9511 |
| 1977.8 | 55 | 423.9273 | 41.3673 | 349 | 501 | 0.2584 | -1.0297 |
| 1978.3 | 55 | 447.3636 | 46.6613 | 328 | 543 | -0.3049 | -0.1116 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 55 | 380.2727 | 43.2034 | 268 | 465 | -0.1792 | 0.1601 |
| 1977.3 | 55 | 424.3636 | 51.2125 | 301 | 528 | -0.3670 | 0.1964 |
| 1977.8 | 55 | 418.6000 | 28.8544 | 349 | 470 | -0.0945 | -0.6794 |
| 1978.3 | 55 | 457.5273 | 56.9525 | 324 | 617 | -0.0073 | 0.5208 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 55 | 388.9091 | 51.9085 | 296 | 494 | 0.0966 | -0.7302 |
| 1977.3 | 55 | 434.4182 | 61.9037 | 301 | 599 | 0.7914 | 1.2723 |
| 1977.8 | 55 | 447.9818 | 58.0981 | 307 | 550 | -0.3053 | -0.2010 |
| 1978.3 | 55 | 444.2909 | 54.4238 | 333 | 570 | 0.2262 | -0.4789 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 55 | 379.7091 | 67.9432 | 157 | 544 | -0.5698 | 2.2837 |
| 1977.3 | 55 | 418.8909 | 70.5507 | 248 | 601 | 0.1933 | 0.0646 |
| 1977.8 | 55 | 436.1273 | 61.6279 | 283 | 540 | -0.2288 | 0.0082 |
| 1978.3 | 55 | 458.4182 | 61.1197 | 332 | 577 | -0.0767 | -0.5925 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 320

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| TOTAL READING | | | | | | | |
| 1976.3 | 12 | 366.2500 | 68.1457 | 253 | 520 | 0.4118 | 2.0233 |
| 1977.3 | 12 | 375.5000 | 59.4605 | 273 | 506 | 0.7988 | 1.6974 |
| 1977.8 | 12 | 395.2500 | 74.0161 | 303 | 583 | 1.4743 | 3.2577 |
| 1978.3 | 12 | 431.4167 | 71.2875 | 323 | 584 | 0.6704 | 0.6186 |
| READ VOCAB | | | | | | | |
| 1976.3 | 12 | 359.1667 | 69.0413 | 229 | 480 | -0.3874 | 0.4021 |
| 1977.3 | 12 | 387.8333 | 72.1335 | 230 | 541 | -0.0970 | 2.8859 |
| 1977.8 | 12 | 398.1667 | 81.0509 | 320 | 590 | 1.6119 | 2.1431 |
| 1978.3 | 12 | 431.6667 | 83.2579 | 321 | 642 | 1.4193 | 3.0680 |
| READ COMP | | | | | | | |
| 1976.3 | 12 | 392.5000 | 70.8500 | 304 | 571 | 1.2848 | 3.2007 |
| 1977.3 | 12 | 378.0833 | 62.2304 | 286 | 497 | 0.8099 | 0.4108 |
| 1977.8 | 12 | 410.4167 | 67.6508 | 304 | 559 | 0.5604 | 1.1117 |
| 1978.3 | 12 | 430.0000 | 68.8622 | 364 | 573 | 0.3411 | -0.9134 |
| TOTAL MATH | | | | | | | |
| 1976.3 | 12 | 344.0833 | 55.5640 | 232 | 454 | -0.0465 | 1.2169 |
| 1977.3 | 12 | 392.5000 | 49.8096 | 322 | 524 | 1.5686 | 4.4296 |
| 1977.8 | 12 | 382.5000 | 49.4892 | 329 | 520 | 2.0984 | 5.7124 |
| 1978.3 | 12 | 434.2500 | 60.9562 | 342 | 588 | 1.2144 | 3.4387 |
| MATH COMPUT | | | | | | | |
| 1976.3 | 12 | 354.5833 | 47.1775 | 268 | 428 | -0.2130 | -0.5817 |
| 1977.3 | 12 | 411.4167 | 40.6011 | 352 | 500 | 0.6750 | 0.7598 |
| 1977.8 | 12 | 381.4167 | 41.2034 | 309 | 470 | 0.4443 | 1.2816 |
| 1978.3 | 12 | 443.5833 | 60.3467 | 345 | 584 | 0.8879 | 2.0337 |
| MATH CONC | | | | | | | |
| 1976.3 | 12 | 350.0000 | 74.4495 | 244 | 536 | 1.3280 | 3.0332 |
| 1977.3 | 12 | 384.1667 | 67.0411 | 301 | 543 | 1.0889 | 1.6935 |
| 1977.8 | 12 | 396.5000 | 63.2003 | 318 | 550 | 1.2510 | 2.1650 |
| 1978.3 | 12 | 444.7500 | 76.1627 | 333 | 544 | -0.2957 | -1.7279 |
| MATH APPLIC | | | | | | | |
| 1976.3 | 12 | 341.8333 | 87.9895 | 212 | 501 | 0.0009 | -0.5286 |
| 1977.3 | 12 | 374.5000 | 77.1156 | 248 | 568 | 1.2440 | 3.5173 |
| 1977.8 | 12 | 394.5000 | 69.4413 | 298 | 540 | 0.9719 | 0.7531 |
| 1978.3 | 12 | 426.3333 | 77.3508 | 313 | 608 | 0.9151 | 1.9431 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 322

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 66 | 347.7424 | 53.4388 | 253 | 455 | -0.0709 | -1.3019 |
| 1977.3 | 66 | 384.0455 | 59.2648 | 296 | 584 | 1.0887 | 1.7813 |
| 1977.8 | 66 | 354.7121 | 59.5717 | 221 | 568 | 0.8750 | 2.1284 |
| 1978.3 | 66 | 373.8636 | 58.4978 | 280 | 530 | 0.5756 | -0.3807 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 66 | 344.1061 | 50.0754 | 255 | 467 | 0.2424 | -0.2979 |
| 1977.3 | 66 | 398.4091 | 70.8648 | 266 | 673 | 1.7829 | 5.2917 |
| 1977.8 | 66 | 358.5303 | 54.7094 | 230 | 555 | 0.5138 | 2.0221 |
| 1978.3 | 66 | 369.8333 | 53.6245 | 266 | 518 | 0.5190 | 0.1610 |
| **READ COMP** | | | | | | | |
| 1976.3 | 66 | 371.2121 | 60.3035 | 268 | 462 | -0.1252 | -1.5157 |
| 1977.3 | 66 | 384.5606 | 67.2790 | 256 | 553 | 0.4007 | -0.4178 |
| 1977.8 | 66 | 365.6515 | 72.6150 | 192 | 580 | 0.5021 | 0.8531 |
| 1978.3 | 66 | 400.5152 | 67.3186 | 274 | 560 | 0.2976 | -0.6460 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 66 | 342.9091 | 40.5268 | 245 | 445 | -0.0140 | -0.2434 |
| 1977.3 | 66 | 389.1212 | 62.3544 | 301 | 604 | 1.1704 | 1.7502 |
| 1977.8 | 66 | 367.2121 | 54.4040 | 263 | 520 | 0.8035 | 0.5147 |
| 1978.3 | 66 | 395.2424 | 61.1432 | 287 | 553 | 0.6119 | 0.0227 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 66 | 352.4545 | 42.4025 | 275 | 465 | 0.3837 | -0.0253 |
| 1977.3 | 66 | 403.3485 | 59.1833 | 301 | 569 | 0.8606 | 0.9446 |
| 1977.8 | 66 | 377.9242 | 45.0089 | 289 | 470 | 0.2937 | -0.7411 |
| 1978.3 | 66 | 408.8636 | 61.9387 | 230 | 584 | 0.1109 | 0.8592 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 66 | 364.6061 | 58.4460 | 261 | 494 | 0.4441 | -0.7552 |
| 1977.3 | 66 | 398.1667 | 71.6430 | 281 | 599 | 0.8318 | 0.8661 |
| 1977.8 | 66 | 365.6364 | 76.6181 | 167 | 550 | 0.1826 | 0.2917 |
| 1978.3 | 66 | 392.1515 | 70.5114 | 236 | 597 | 0.7931 | 0.9473 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 66 | 337.4545 | 60.8995 | 157 | 501 | -0.5821 | 2.1315 |
| 1977.3 | 66 | 379.1818 | 69.8975 | 248 | 645 | 1.0503 | 2.2675 |
| 1977.8 | 66 | 358.4394 | 76.4793 | 185 | 540 | 0.5280 | -0.0034 |
| 1978.3 | 66 | 395.3636 | 77.1972 | 219 | 577 | 0.0618 | -0.2227 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 334

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 45 | 325.7333 | 49.9014 | 225 | 449 | 0.5445 | 0.3710 |
| 1977.3 | 45 | 355.4667 | 54.4233 | 281 | 486 | 0.5582 | -0.6080 |
| 1977.8 | 45 | 384.7778 | 57.4622 | 280 | 537 | 0.6972 | 0.5795 |
| 1978.3 | 45 | 446.4889 | 77.3436 | 233 | 624 | -0.1238 | 0.6915 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 45 | 314.3556 | 52.6999 | 229 | 446 | 0.4090 | -0.4299 |
| 1977.3 | 45 | 363.2444 | 46.1224 | 282 | 475 | 0.3693 | -0.0554 |
| 1977.8 | 45 | 377.1556 | 59.1166 | 265 | 524 | 0.3995 | -0.2993 |
| 1978.3 | 45 | 458.4444 | 94.3915 | 297 | 690 | 0.4254 | -0.4093 |
| **READ COMP** | | | | | | | |
| 1976.3 | 45 | 356.3111 | 61.1518 | 225 | 543 | 0.8630 | 1.3939 |
| 1977.3 | 45 | 368.0667 | 65.1632 | 256 | 512 | 0.3819 | -0.5621 |
| 1977.8 | 45 | 411.9111 | 57.6056 | 314 | 539 | 0.5104 | 0.2575 |
| 1978.3 | 45 | 464.1333 | 71.0811 | 248 | 644 | -0.2483 | 1.9942 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 45 | 327.6000 | 36.7642 | 245 | 403 | -0.0943 | -0.3421 |
| 1977.3 | 45 | 369.0889 | 38.0632 | 290 | 457 | 0.0375 | -0.5163 |
| 1977.8 | 45 | 379.3556 | 49.8480 | 227 | 511 | 0.0074 | 1.9190 |
| 1978.3 | 45 | 442.3778 | 54.9195 | 318 | 632 | 0.6712 | 2.3220 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 45 | 336.3333 | 44.0599 | 254 | 444 | 0.2191 | -0.3594 |
| 1977.3 | 45 | 388.9333 | 41.6241 | 309 | 464 | 0.0086 | -0.9865 |
| 1977.8 | 45 | 391.1333 | 46.0373 | 252 | 470 | -0.5722 | 0.6319 |
| 1978.3 | 45 | 470.6000 | 50.3178 | 345 | 584 | 0.0145 | 0.1125 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 45 | 342.8889 | 47.1411 | 261 | 465 | 0.3807 | -0.2376 |
| 1977.3 | 45 | 357.6000 | 48.4503 | 261 | 484 | 0.5042 | 0.1640 |
| 1977.8 | 45 | 384.8667 | 61.2779 | 236 | 550 | 0.4288 | 0.8216 |
| 1978.3 | 45 | 415.9556 | 78.3285 | 281 | 597 | 0.1613 | -0.6644 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 45 | 320.2444 | 54.2587 | 212 | 431 | -0.2768 | -0.5891 |
| 1977.3 | 45 | 365.3333 | 44.1104 | 248 | 491 | 0.1217 | 1.2552 |
| 1977.8 | 45 | 372.7111 | 66.8161 | 228 | 503 | -0.2461 | -0.2145 |
| 1978.3 | 45 | 420.2222 | 83.3001 | 246 | 651 | 0.6762 | 0.5025 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 344

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 114 | 372.2632 | 60.4158 | 225 | 520 | -0.1072 | -0.2696 |
| 1977.3 | 114 | 404.3246 | 63.6607 | 265 | 554 | -0.2803 | -0.5330 |
| 1977.8 | 114 | 425.7982 | 68.3260 | 265 | 618 | 0.0831 | 0.0813 |
| 1978.3 | 114 | 450.9386 | 66.0404 | 280 | 656 | -0.1385 | 0.5577 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 114 | 367.3246 | 61.5965 | 181 | 496 | -0.2206 | -0.0002 |
| 1977.3 | 114 | 396.9561 | 62.5637 | 230 | 528 | -0.3291 | -0.0917 |
| 1977.8 | 114 | 420.0789 | 67.1949 | 255 | 590 | 0.0646 | -0.1548 |
| 1978.3 | 114 | 436.0614 | 68.9322 | 248 | 642 | 0.0605 | 0.4386 |
| **READ COMP** | | | | | | | |
| 1976.3 | 114 | 398.9825 | 69.0747 | 255 | 571 | 0.1693 | -0.4916 |
| 1977.3 | 114 | 428.4386 | 67.5148 | 271 | 602 | -0.0915 | -0.4206 |
| 1977.8 | 114 | 450.1053 | 73.5673 | 261 | 624 | -0.2511 | 0.1341 |
| 1978.3 | 114 | 481.9298 | 68.3283 | 274 | 692 | -0.0261 | 1.1277 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 114 | 376.3509 | 43.7322 | 207 | 502 | 0.0364 | 0.8025 |
| 1977.3 | 114 | 409.7368 | 48.3712 | 268 | 524 | -0.2033 | -0.0504 |
| 1977.8 | 114 | 414.4825 | 42.7442 | 312 | 511 | 0.1830 | -0.4467 |
| 1978.3 | 114 | 449.9912 | 57.2392 | 313 | 602 | 0.1664 | 0.2013 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 114 | 388.7719 | 45.8134 | 258 | 465 | -0.1715 | -0.2454 |
| 1977.3 | 114 | 424.7807 | 49.9201 | 286 | 547 | -0.1732 | 0.0357 |
| 1977.8 | 114 | 415.7544 | 32.2245 | 330 | 470 | -0.2218 | -0.5554 |
| 1978.3 | 114 | 469.0877 | 63.1782 | 293 | 617 | 0.1333 | -0.1035 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 114 | 385.7456 | 63.6276 | 225 | 536 | 0.2166 | -0.4409 |
| 1977.3 | 114 | 412.7982 | 59.0635 | 281 | 543 | -0.1987 | -0.3042 |
| 1977.8 | 114 | 430.5263 | 58.7663 | 296 | 550 | 0.0213 | -0.4327 |
| 1978.3 | 114 | 447.4386 | 72.6994 | 260 | 626 | 0.1856 | -0.3795 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 114 | 373.3421 | 66.4592 | 157 | 544 | -0.1174 | 0.1221 |
| 1977.3 | 114 | 400.7368 | 73.0921 | 194 | 601 | -0.3530 | 0.8310 |
| 1977.8 | 114 | 422.5877 | 63.7410 | 248 | 540 | -0.1617 | -0.0056 |
| 1978.3 | 114 | 441.9211 | 68.5550 | 219 | 651 | -0.1465 | 0.8576 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 368

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 17 | 364.8235 | 39.1795 | 303 | 449 | 0.4100 | -0.0914 |
| 1977.3 | 17 | 409.2353 | 42.1627 | 343 | 490 | 0.3592 | -0.4310 |
| 1977.8 | 17 | 411.9412 | 42.7996 | 341 | 496 | 0.3023 | -0.2069 |
| 1978.3 | 17 | 430.9412 | 54.5407 | 334 | 518 | -0.2382 | -0.9965 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 17 | 362.6471 | 40.6463 | 288 | 456 | 0.2878 | 0.5932 |
| 1977.3 | 17 | 411.4706 | 42.6514 | 334 | 498 | 0.4154 | 0.2692 |
| 1977.8 | 17 | 404.8235 | 45.0780 | 341 | 497 | 0.3324 | -0.4004 |
| 1978.3 | 17 | 418.5882 | 39.2652 | 364 | 491 | 0.2213 | -1.1679 |
| **READ COMP** | | | | | | | |
| 1976.3 | 17 | 387.5294 | 46.3237 | 323 | 502 | 0.9479 | 1.0717 |
| 1977.3 | 17 | 420.4706 | 49.9876 | 329 | 504 | 0.1264 | -0.2595 |
| 1977.8 | 17 | 438.0000 | 42.8135 | 361 | 521 | 0.1160 | -0.4069 |
| 1978.3 | 17 | 454.2353 | 77.4633 | 290 | 605 | -0.3495 | 0.1988 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 17 | 352.5294 | 22.9568 | 306 | 378 | -0.9569 | -0.0596 |
| 1977.3 | 17 | 397.4706 | 36.4711 | 326 | 452 | -0.4219 | -0.6811 |
| 1977.8 | 17 | 393.2353 | 33.7000 | 335 | 444 | -0.4590 | -0.8530 |
| 1978.3 | 17 | 438.0000 | 56.4015 | 318 | 543 | -0.6671 | 0.4727 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 17 | 360.7647 | 20.3455 | 319 | 404 | -0.2653 | 0.6017 |
| 1977.3 | 17 | 414.5882 | 38.0395 | 345 | 471 | -0.2555 | -1.0667 |
| 1977.8 | 17 | 398.6471 | 30.9716 | 349 | 445 | -0.2277 | -1.1123 |
| 1978.3 | 17 | 441.3529 | 55.0181 | 345 | 519 | -0.6694 | -0.6100 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 17 | 361.9412 | 30.9343 | 305 | 410 | -0.3521 | -0.8578 |
| 1977.3 | 17 | 386.8824 | 44.4647 | 301 | 454 | -0.2962 | -0.7160 |
| 1977.8 | 17 | 413.5294 | 61.0370 | 296 | 550 | -0.0320 | 0.7673 |
| 1978.3 | 17 | 451.1176 | 54.9191 | 350 | 570 | 0.1450 | 0.1983 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 17 | 344.2941 | 59.1743 | 212 | 418 | -0.9613 | 0.4395 |
| 1977.3 | 17 | 391.5294 | 45.1208 | 296 | 451 | -0.4961 | -0.5220 |
| 1977.8 | 17 | 394.1176 | 54.0114 | 266 | 456 | -1.2389 | 0.7591 |
| 1978.3 | 17 | 447.3529 | 78.6805 | 271 | 577 | -0.6783 | 0.3444 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 379

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 80 | 333.2000 | 61.2960 | 209 | 607 | 1.4247 | 4.5991 |
| 1977.3 | 80 | 344.1875 | 62.8235 | 171 | 497 | 0.3854 | 0.2936 |
| 1977.8 | 80 | 370.7875 | 70.5949 | 204 | 597 | 0.4725 | 1.4343 |
| 1978.3 | 80 | 392.5125 | 67.1326 | 265 | 640 | 0.7433 | 1.6009 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 80 | 329.4500 | 55.1706 | 210 | 538 | 1.0876 | 3.1048 |
| 1977.3 | 80 | 359.4500 | 61.7455 | 210 | 541 | 0.4763 | 0.6254 |
| 1977.8 | 80 | 363.4875 | 68.1783 | 199 | 590 | 0.3457 | 1.2942 |
| 1978.3 | 80 | 383.8500 | 67.9816 | 230 | 606 | 0.7142 | 1.8659 |
| **READ COMP** | | | | | | | |
| 1976.3 | 80 | 356.5750 | 69.9386 | 209 | 643 | 1.0541 | 2.9369 |
| 1977.3 | 80 | 351.0250 | 70.3141 | 191 | 567 | 0.5018 | 0.4094 |
| 1977.8 | 80 | 396.6000 | 74.1819 | 224 | 602 | 0.2558 | 0.2152 |
| 1978.3 | 80 | 422.9375 | 72.2160 | 274 | 667 | 0.2725 | 0.9560 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 80 | 340.4875 | 42.0380 | 240 | 488 | 0.1896 | 1.5480 |
| 1977.3 | 80 | 363.8750 | 44.2568 | 268 | 488 | 0.0401 | -0.2097 |
| 1977.8 | 80 | 379.9750 | 36.6509 | 278 | 483 | 0.0863 | 0.5272 |
| 1978.3 | 80 | 419.4500 | 47.8039 | 292 | 534 | -0.3793 | 0.5637 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 80 | 358.4000 | 39.0578 | 262 | 465 | -0.0152 | 0.1869 |
| 1977.3 | 80 | 385.6500 | 40.7335 | 286 | 471 | 0.0196 | -0.4713 |
| 1977.8 | 80 | 386.9250 | 33.3056 | 289 | 457 | -0.2741 | 0.4727 |
| 1978.3 | 80 | 438.3500 | 49.9861 | 324 | 584 | -0.0143 | 0.3205 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 80 | 340.8500 | 51.6677 | 225 | 494 | 0.5441 | 0.7014 |
| 1977.3 | 80 | 366.6250 | 57.5879 | 239 | 543 | 0.0885 | 0.5139 |
| 1977.8 | 80 | 384.6625 | 49.8522 | 284 | 491 | 0.1828 | -0.4562 |
| 1978.3 | 80 | 416.6500 | 58.9338 | 299 | 570 | 0.1026 | -0.3185 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 80 | 322.4875 | 60.2339 | 187 | 544 | 0.4346 | 1.4379 |
| 1977.3 | 80 | 342.3000 | 68.0185 | 194 | 505 | -0.2272 | -0.2487 |
| 1977.8 | 80 | 388.0375 | 60.5066 | 248 | 540 | 0.1927 | 0.2749 |
| 1978.3 | 80 | 405.5375 | 67.6098 | 219 | 551 | -0.3598 | 0.4259 |

## DISTRIBUTION SUMMARY STATISTICS

COHORT = 4 NOSCH = 382

| SCORES / DATE | N | MEAN | STANDARD DEVIATION | MIN | MAX | SKEWNESS | KURTOSIS |
|---|---|---|---|---|---|---|---|
| **TOTAL READING** | | | | | | | |
| 1976.3 | 32 | 343.3438 | 41.1509 | 277 | 413 | 0.2806 | -1.1310 |
| 1977.3 | 32 | 378.9063 | 62.8661 | 230 | 584 | 0.6228 | 2.9692 |
| 1977.8 | 32 | 404.7500 | 36.6069 | 316 | 473 | -0.1798 | -0.1167 |
| 1978.3 | 32 | 439.7500 | 46.0862 | 344 | 508 | -0.6312 | -0.5929 |
| **READ VOCAB** | | | | | | | |
| 1976.3 | 32 | 333.9375 | 39.1407 | 267 | 429 | 0.5129 | -0.2656 |
| 1977.3 | 32 | 383.0000 | 66.0425 | 210 | 577 | 0.1435 | 2.1233 |
| 1977.8 | 32 | 403.9375 | 46.9996 | 314 | 497 | 0.3748 | -0.2288 |
| 1978.3 | 32 | 419.2500 | 44.7603 | 331 | 491 | -0.2975 | -0.6892 |
| **READ COMP** | | | | | | | |
| 1976.3 | 32 | 371.0938 | 48.9116 | 281 | 462 | 0.1147 | -1.0591 |
| 1977.3 | 32 | 390.6563 | 63.2989 | 286 | 602 | 1.1057 | 2.6159 |
| 1977.8 | 32 | 426.2500 | 43.1098 | 272 | 489 | -1.4651 | 4.4592 |
| 1978.3 | 32 | 473.9375 | 49.9251 | 364 | 560 | -0.5329 | -0.3530 |
| **TOTAL MATH** | | | | | | | |
| 1976.3 | 32 | 352.5000 | 31.0317 | 271 | 417 | -0.7101 | 1.4462 |
| 1977.3 | 32 | 380.6250 | 41.5434 | 301 | 493 | 0.4651 | 0.5286 |
| 1977.8 | 32 | 369.8125 | 26.3211 | 299 | 427 | -0.4278 | 0.7549 |
| 1978.3 | 32 | 424.7188 | 36.1674 | 338 | 485 | -0.6428 | 0.0817 |
| **MATH COMPUT** | | | | | | | |
| 1976.3 | 32 | 368.6250 | 38.1083 | 281 | 428 | -0.7929 | 0.3869 |
| 1977.3 | 32 | 389.0000 | 49.9593 | 316 | 547 | 0.9980 | 1.6566 |
| 1977.8 | 32 | 379.9688 | 36.7840 | 261 | 457 | -0.6395 | 2.8732 |
| 1978.3 | 32 | 429.0000 | 48.3949 | 285 | 519 | -0.9333 | 1.7835 |
| **MATH CONC** | | | | | | | |
| 1976.3 | 32 | 350.5313 | 40.6281 | 244 | 443 | -0.2910 | 0.8408 |
| 1977.3 | 32 | 404.1250 | 57.3674 | 281 | 635 | 1.8173 | 8.0754 |
| 1977.8 | 32 | 386.8125 | 37.6601 | 296 | 450 | -0.0723 | -0.3588 |
| 1978.3 | 32 | 462.5625 | 48.7151 | 366 | 570 | 0.1177 | 0.2127 |
| **MATH APPLIC** | | | | | | | |
| 1976.3 | 32 | 344.7813 | 42.3707 | 256 | 431 | -0.0603 | -0.0917 |
| 1977.3 | 32 | 373.0938 | 55.0286 | 248 | 521 | 0.2023 | 1.0511 |
| 1977.8 | 32 | 360.0313 | 47.2369 | 248 | 440 | -0.3757 | 0.0892 |
| 1978.3 | 32 | 410.8125 | 46.4893 | 293 | 485 | -0.8567 | 0.4414 |

TABLE III B

(Pages 68-71)

EXPANDED STANDARD SCORES CORRESPONDING TO SELECTED PERCENTILE RANKS FOR THE DISTRIBUTIONS OF TOTAL READING AND TOTAL MATHEMATICS SCORES FOR EACH SCHOOL IN EACH TREATMENT GROUP IN EACH COHORT

## READING

### PERCENTILES FOR TOTAL READING EXPANDED STANDARD SCORES

| COHORT | NO SCH | N | TEST DATE | 1 | 5 | 10 | 25 | MEDIAN 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 302 | 31 | 1976.3 | 298 | 310 | 320 | 339 | 377 | 440 | 477 | 519 | 544 |
| 3 | 302 | 31 | 1977.3 | 280 | 308 | 345 | 394 | 430 | 553 | 581 | 597 | 605 |
| 3 | 302 | 31 | 1977.8 | 270 | 314 | 370 | 395 | 452 | 530 | 581 | 589 | 605 |
| 3 | 302 | 31 | 1978.3 | 310 | 344 | 376 | 407 | 451 | 526 | 553 | 572 | 636 |
| 3 | 309 | 47 | 1976.3 | 239 | 274 | 283 | 298 | 337 | 377 | 398 | 430 | 472 |
| 3 | 309 | 47 | 1977.3 | 260 | 296 | 321 | 344 | 393 | 425 | 473 | 542 | 583 |
| 3 | 309 | 47 | 1977.8 | 221 | 272 | 278 | 333 | 403 | 438 | 473 | 527 | 576 |
| 3 | 309 | 47 | 1978.3 | 256 | 265 | 288 | 354 | 418 | 454 | 472 | 512 | 597 |
| 3 | 320 | 10 | 1976.3 | 288 | 288 | 288 | 321 | 383 | 395 | 416 | 432 | 446 |
| 3 | 320 | 10 | 1977.3 | 213 | 213 | 213 | 313 | 387 | 440 | 537 | 573 | 602 |
| 3 | 320 | 10 | 1977.8 | 299 | 299 | 299 | 356 | 421 | 456 | 484 | 510 | 532 |
| 3 | 320 | 10 | 1978.3 | 381 | 381 | 381 | 408 | 441 | 495 | 532 | 547 | 560 |
| 3 | 322 | 60 | 1976.3 | 239 | 246 | 259 | 272 | 293 | 316 | 342 | 374 | 405 |
| 3 | 322 | 60 | 1977.3 | 254 | 270 | 285 | 299 | 341 | 404 | 522 | 553 | 589 |
| 3 | 322 | 60 | 1977.8 | 248 | 290 | 299 | 316 | 350 | 382 | 425 | 441 | 512 |
| 3 | 322 | 60 | 1978.3 | 211 | 281 | 288 | 310 | 336 | 381 | 438 | 470 | 517 |
| 3 | 334 | 15 | 1976.3 | 246 | 246 | 249 | 272 | 283 | 296 | 337 | 347 | 366 |
| 3 | 334 | 15 | 1977.3 | 265 | 265 | 265 | 275 | 294 | 331 | 339 | 347 | 356 |
| 3 | 334 | 15 | 1977.8 | 280 | 280 | 282 | 290 | 322 | 352 | 361 | 367 | 375 |
| 3 | 334 | 15 | 1978.3 | 273 | 273 | 280 | 296 | 314 | 336 | 357 | 391 | 467 |
| 3 | 344 | 96 | 1976.3 | 217 | 252 | 263 | 293 | 335 | 386 | 434 | 462 | 521 |
| 3 | 344 | 96 | 1977.3 | 221 | 259 | 278 | 308 | 364 | 407 | 499 | 525 | 554 |
| 3 | 344 | 96 | 1977.8 | 254 | 288 | 299 | 338 | 387 | 435 | 522 | 540 | 569 |
| 3 | 344 | 96 | 1978.3 | 281 | 302 | 317 | 360 | 412 | 461 | 525 | 565 | 610 |
| 3 | 379 | 98 | 1976.3 | 232 | 258 | 266 | 286 | 316 | 354 | 390 | 411 | 441 |
| 3 | 379 | 98 | 1977.3 | 221 | 265 | 274 | 294 | 341 | 369 | 402 | 421 | 442 |
| 3 | 379 | 98 | 1977.8 | 229 | 247 | 270 | 299 | 344 | 378 | 405 | 422 | 465 |
| 3 | 379 | 98 | 1978.3 | 211 | 261 | 279 | 317 | 354 | 395 | 420 | 451 | 483 |
| 3 | 382 | 33 | 1976.3 | 266 | 270 | 275 | 293 | 320 | 356 | 376 | 378 | 389 |
| 3 | 382 | 33 | 1977.3 | 275 | 293 | 304 | 340 | 369 | 403 | 423 | 442 | 527 |
| 3 | 382 | 33 | 1977.8 | 270 | 286 | 300 | 337 | 374 | 400 | 427 | 443 | 459 |
| 3 | 382 | 33 | 1978.3 | 296 | 296 | 298 | 338 | 384 | 422 | 447 | 477 | 492 |
| 3 | 395 | 32 | 1976.3 | 239 | 239 | 246 | 266 | 308 | 339 | 388 | 396 | 426 |
| 3 | 395 | 32 | 1977.3 | 280 | 283 | 290 | 312 | 335 | 371 | 400 | 417 | 450 |
| 3 | 395 | 32 | 1977.8 | 242 | 249 | 264 | 320 | 347 | 401 | 438 | 451 | 467 |
| 3 | 395 | 32 | 1978.3 | 248 | 272 | 320 | 376 | 412 | 454 | 479 | 497 | 500 |

READING

PERCENTILES FOR TOTAL READING EXPANDED STANDARD SCORES

| COHORT | NO SCH | N | TEST DATE | 1 | 5 | 10 | 25 | MEDIAN 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 302 | 25 | 1976.3 | 328 | 339 | 373 | 376 | 393 | 429 | 501 | 526 | 545 |
| 4 | 302 | 25 | 1977.3 | 324 | 325 | 350 | 383 | 433 | 496 | 594 | 637 | 671 |
| 4 | 302 | 25 | 1977.8 | 328 | 336 | 367 | 391 | 436 | 471 | 515 | 545 | 586 |
| 4 | 302 | 25 | 1978.3 | 400 | 401 | 413 | 446 | 489 | 544 | 618 | 652 | 668 |
| 4 | 309 | 55 | 1976.3 | 277 | 295 | 314 | 341 | 383 | 423 | 462 | 486 | 527 |
| 4 | 309 | 55 | 1977.3 | 303 | 324 | 343 | 386 | 426 | 474 | 504 | 523 | 590 |
| 4 | 309 | 55 | 1977.8 | 331 | 360 | 374 | 399 | 430 | 487 | 545 | 553 | 573 |
| 4 | 309 | 55 | 1978.3 | 339 | 364 | 391 | 412 | 452 | 504 | 541 | 597 | 616 |
| 4 | 320 | 12 | 1976.3 | 253 | 253 | 256 | 328 | 374 | 386 | 400 | 449 | 506 |
| 4 | 320 | 12 | 1977.3 | 273 | 273 | 283 | 349 | 365 | 381 | 444 | 477 | 500 |
| 4 | 320 | 12 | 1977.8 | 303 | 303 | 306 | 338 | 379 | 407 | 456 | 512 | 569 |
| 4 | 320 | 12 | 1978.3 | 323 | 323 | 329 | 386 | 408 | 472 | 500 | 535 | 574 |
| 4 | 322 | 66 | 1976.3 | 253 | 268 | 275 | 296 | 352 | 395 | 405 | 417 | 448 |
| 4 | 322 | 66 | 1977.3 | 296 | 312 | 317 | 336 | 371 | 424 | 447 | 457 | 577 |
| 4 | 322 | 66 | 1977.8 | 221 | 263 | 286 | 314 | 350 | 387 | 419 | 439 | 529 |
| 4 | 322 | 66 | 1978.3 | 280 | 289 | 304 | 328 | 358 | 417 | 465 | 478 | 502 |
| 4 | 334 | 45 | 1976.3 | 225 | 249 | 259 | 293 | 318 | 349 | 390 | 422 | 447 |
| 4 | 334 | 45 | 1977.3 | 281 | 281 | 292 | 310 | 336 | 407 | 418 | 430 | 483 |
| 4 | 334 | 45 | 1977.8 | 280 | 289 | 309 | 346 | 377 | 420 | 456 | 505 | 524 |
| 4 | 334 | 45 | 1978.3 | 233 | 306 | 356 | 391 | 456 | 489 | 533 | 572 | 618 |
| 4 | 344 | 114 | 1976.3 | 226 | 270 | 283 | 328 | 376 | 415 | 447 | 471 | 495 |
| 4 | 344 | 114 | 1977.3 | 266 | 286 | 310 | 363 | 412 | 448 | 483 | 494 | 526 |
| 4 | 344 | 114 | 1977.8 | 266 | 308 | 335 | 389 | 417 | 473 | 508 | 537 | 581 |
| 4 | 344 | 114 | 1978.3 | 281 | 343 | 365 | 406 | 456 | 491 | 516 | 547 | 597 |
| 4 | 368 | 17 | 1976.3 | 303 | 303 | 312 | 329 | 365 | 394 | 410 | 427 | 445 |
| 4 | 368 | 17 | 1977.3 | 343 | 343 | 347 | 381 | 402 | 429 | 460 | 481 | 489 |
| 4 | 368 | 17 | 1977.8 | 341 | 341 | 351 | 384 | 404 | 437 | 459 | 486 | 494 |
| 4 | 368 | 17 | 1978.3 | 334 | 334 | 351 | 378 | 426 | 474 | 491 | 502 | 515 |
| 4 | 379 | 80 | 1976.3 | 209 | 253 | 266 | 293 | 324 | 363 | 400 | 416 | 527 |
| 4 | 379 | 80 | 1977.3 | 171 | 256 | 273 | 303 | 330 | 381 | 434 | 451 | 494 |
| 4 | 379 | 80 | 1977.8 | 204 | 248 | 275 | 324 | 369 | 410 | 455 | 484 | 586 |
| 4 | 379 | 80 | 1978.3 | 265 | 287 | 306 | 349 | 391 | 430 | 460 | 499 | 578 |
| 4 | 382 | 32 | 1976.3 | 277 | 281 | 294 | 308 | 332 | 374 | 407 | 409 | 412 |
| 4 | 382 | 32 | 1977.3 | 230 | 270 | 294 | 336 | 386 | 404 | 439 | 450 | 544 |
| 4 | 382 | 32 | 1977.8 | 316 | 335 | 358 | 379 | 404 | 435 | 447 | 458 | 473 |
| 4 | 382 | 32 | 1978.3 | 344 | 350 | 364 | 391 | 452 | 468 | 491 | 498 | 506 |

## MATHEMATICS

### PERCENTILES FOR TOTAL MATHEMATICS EXPANDED STANDARD SCORES

| COHORT | NO SCH | N | TEST DATE | PERCENTILES 1 | 5 | 10 | 25 | MEDIAN 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 302 | 31 | 1976.3 | 290 | 294 | 302 | 336 | 368 | 383 | 421 | 429 | 456 |
| 3 | 302 | 31 | 1977.3 | 352 | 354 | 361 | 372 | 386 | 446 | 497 | 505 | 511 |
| 3 | 302 | 31 | 1977.8 | 329 | 345 | 358 | 375 | 413 | 474 | 500 | 515 | 520 |
| 3 | 302 | 31 | 1978.3 | 345 | 366 | 390 | 416 | 448 | 472 | 516 | 524 | 559 |
| 3 | 309 | 47 | 1976.3 | 257 | 260 | 292 | 318 | 355 | 374 | 397 | 403 | 443 |
| 3 | 309 | 47 | 1977.3 | 285 | 287 | 328 | 347 | 367 | 400 | 423 | 440 | 499 |
| 3 | 309 | 47 | 1977.8 | 274 | 291 | 313 | 358 | 392 | 418 | 451 | 463 | 499 |
| 3 | 309 | 47 | 1978.3 | 279 | 296 | 325 | 380 | 421 | 448 | 470 | 481 | 589 |
| 3 | 320 | 10 | 1976.3 | 298 | 298 | 299 | 306 | 332 | 363 | 393 | 411 | 425 |
| 3 | 320 | 10 | 1977.3 | 278 | 278 | 278 | 342 | 399 | 431 | 483 | 492 | 499 |
| 3 | 320 | 10 | 1977.8 | 309 | 309 | 309 | 352 | 396 | 425 | 438 | 474 | 504 |
| 3 | 320 | 10 | 1978.3 | 340 | 340 | 340 | 375 | 434 | 464 | 488 | 515 | 537 |
| 3 | 322 | 60 | 1976.3 | 217 | 236 | 249 | 260 | 281 | 308 | 332 | 349 | 379 |
| 3 | 322 | 60 | 1977.3 | 255 | 285 | 289 | 312 | 349 | 395 | 444 | 474 | 511 |
| 3 | 322 | 60 | 1977.8 | 237 | 263 | 274 | 302 | 331 | 366 | 404 | 451 | 479 |
| 3 | 322 | 60 | 1978.3 | 268 | 279 | 290 | 322 | 349 | 393 | 439 | 469 | 516 |
| 3 | 334 | 15 | 1976.3 | 207 | 207 | 235 | 283 | 311 | 317 | 336 | 352 | 370 |
| 3 | 334 | 15 | 1977.3 | 267 | 267 | 267 | 281 | 329 | 354 | 364 | 373 | 384 |
| 3 | 334 | 15 | 1977.8 | 274 | 274 | 276 | 312 | 351 | 371 | 377 | 384 | 396 |
| 3 | 334 | 15 | 1978.3 | 285 | 285 | 298 | 330 | 359 | 390 | 411 | 425 | 439 |
| 3 | 344 | 96 | 1976.3 | 253 | 270 | 278 | 308 | 345 | 371 | 405 | 424 | 464 |
| 3 | 344 | 96 | 1977.3 | 251 | 305 | 318 | 350 | 381 | 407 | 458 | 476 | 501 |
| 3 | 344 | 96 | 1977.8 | 281 | 308 | 321 | 352 | 385 | 422 | 483 | 492 | 501 |
| 3 | 344 | 96 | 1978.3 | 312 | 335 | 347 | 376 | 414 | 444 | 486 | 511 | 564 |
| 3 | 379 | 98 | 1976.3 | 240 | 260 | 270 | 287 | 313 | 339 | 357 | 370 | 418 |
| 3 | 379 | 98 | 1977.3 | 232 | 250 | 266 | 300 | 341 | 368 | 389 | 396 | 411 |
| 3 | 379 | 98 | 1977.8 | 242 | 269 | 284 | 320 | 350 | 376 | 397 | 432 | 444 |
| 3 | 379 | 98 | 1978.3 | 224 | 285 | 309 | 345 | 383 | 413 | 434 | 437 | 484 |
| 3 | 382 | 33 | 1976.3 | 267 | 276 | 285 | 301 | 333 | 353 | 368 | 376 | 387 |
| 3 | 382 | 33 | 1977.3 | 302 | 310 | 317 | 346 | 364 | 375 | 397 | 421 | 443 |
| 3 | 382 | 33 | 1977.8 | 315 | 317 | 327 | 340 | 362 | 375 | 401 | 415 | 450 |
| 3 | 382 | 33 | 1978.3 | 306 | 339 | 362 | 381 | 407 | 427 | 442 | 458 | 487 |
| 3 | 395 | 32 | 1976.3 | 232 | 242 | 256 | 274 | 295 | 318 | 340 | 357 | 395 |
| 3 | 395 | 32 | 1977.3 | 263 | 276 | 310 | 341 | 357 | 377 | 403 | 414 | 455 |
| 3 | 395 | 32 | 1977.8 | 289 | 291 | 317 | 335 | 352 | 370 | 393 | 415 | 425 |
| 3 | 395 | 32 | 1978.3 | 373 | 373 | 383 | 408 | 432 | 449 | 460 | 480 | 493 |

## MATHEMATICS

### PERCENTILES FOR TOTAL MATHEMATICS EXPANDED STANDARD SCORES

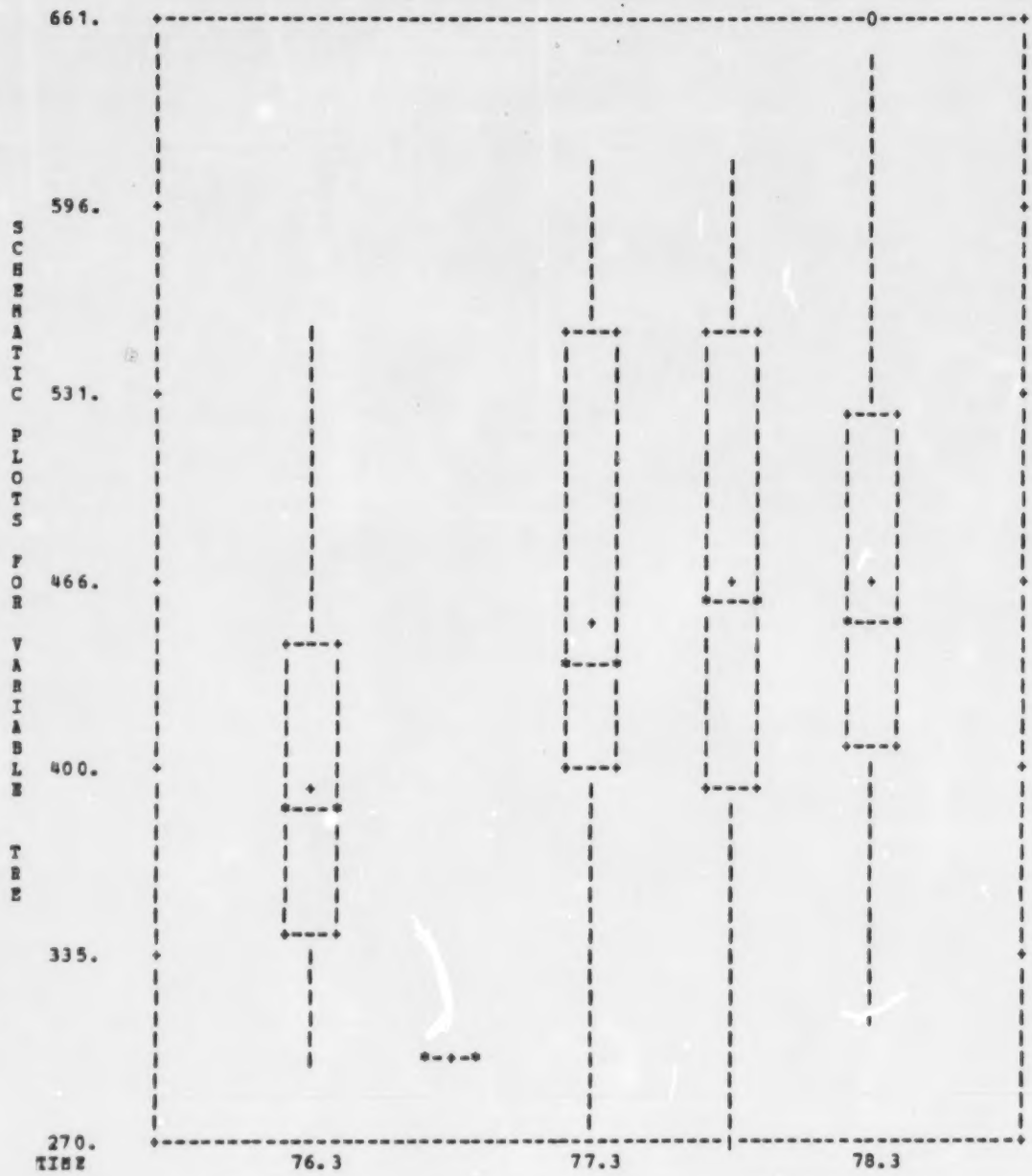
| COHORT | NO SCH | N | TEST DATE | PERCENTILE 1 | 5 | 10 | 25 | MEDIAN 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 302 | 25 | 1976.3 | 334 | 335 | 342 | 357 | 372 | 407 | 450 | 464 | 464 |
| 4 | 302 | 25 | 1977.3 | 331 | 336 | 355 | 392 | 426 | 456 | 525 | 555 | 594 |
| 4 | 302 | 25 | 1977.8 | 372 | 375 | 384 | 397 | 425 | 441 | 492 | 506 | 511 |
| 4 | 302 | 25 | 1978.3 | 407 | 409 | 417 | 432 | 467 | 511 | 538 | 550 | 579 |
| 4 | 309 | 55 | 1976.3 | 257 | 297 | 321 | 351 | 373 | 399 | 417 | 439 | 475 |
| 4 | 309 | 55 | 1977.3 | 296 | 314 | 351 | 393 | 416 | 445 | 479 | 504 | 536 |
| 4 | 309 | 55 | 1977.8 | 349 | 365 | 372 | 389 | 418 | 453 | 483 | 492 | 501 |
| 4 | 309 | 55 | 1978.3 | 328 | 355 | 385 | 416 | 446 | 481 | 505 | 513 | 534 |
| 4 | 320 | 12 | 1976.3 | 232 | 232 | 246 | 303 | 336 | 370 | 387 | 414 | 446 |
| 4 | 320 | 12 | 1977.3 | 322 | 322 | 327 | 361 | 387 | 408 | 408 | 454 | 510 |
| 4 | 320 | 12 | 1977.8 | 329 | 329 | 331 | 352 | 365 | 396 | 405 | 452 | 506 |
| 4 | 320 | 12 | 1978.3 | 342 | 342 | 347 | 398 | 430 | 456 | 462 | 514 | 573 |
| 4 | 322 | 66 | 1976.3 | 245 | 272 | 293 | 311 | 345 | 367 | 390 | 404 | 430 |
| 4 | 322 | 66 | 1977.3 | 301 | 313 | 322 | 340 | 376 | 427 | 449 | 510 | 570 |
| 4 | 322 | 66 | 1977.8 | 263 | 298 | 306 | 333 | 352 | 395 | 447 | 456 | 514 |
| 4 | 322 | 66 | 1978.3 | 287 | 303 | 323 | 347 | 385 | 435 | 473 | 509 | 546 |
| 4 | 334 | 45 | 1976.3 | 245 | 260 | 274 | 299 | 329 | 349 | 378 | 384 | 400 |
| 4 | 334 | 45 | 1977.3 | 290 | 307 | 317 | 336 | 371 | 392 | 415 | 426 | 446 |
| 4 | 334 | 45 | 1977.8 | 227 | 294 | 334 | 350 | 379 | 399 | 438 | 468 | 498 |
| 4 | 334 | 45 | 1978.3 | 318 | 344 | 382 | 406 | 434 | 472 | 505 | 521 | 584 |
| 4 | 344 | 114 | 1976.3 | 215 | 305 | 315 | 347 | 368 | 407 | 442 | 464 | 486 |
| 4 | 344 | 114 | 1977.3 | 273 | 332 | 349 | 376 | 414 | 443 | 467 | 476 | 522 |
| 4 | 344 | 114 | 1977.8 | 314 | 350 | 362 | 384 | 407 | 441 | 474 | 483 | 510 |
| 4 | 344 | 114 | 1978.3 | 314 | 348 | 382 | 410 | 446 | 485 | 523 | 553 | 586 |
| 4 | 368 | 17 | 1976.3 | 306 | 306 | 306 | 335 | 363 | 368 | 375 | 376 | 379 |
| 4 | 368 | 17 | 1977.3 | 326 | 326 | 339 | 363 | 400 | 425 | 437 | 445 | 451 |
| 4 | 368 | 17 | 1977.8 | 335 | 335 | 337 | 362 | 398 | 420 | 428 | 434 | 442 |
| 4 | 368 | 17 | 1978.3 | 318 | 318 | 332 | 391 | 455 | 469 | 478 | 490 | 532 |
| 4 | 379 | 80 | 1976.3 | 240 | 260 | 290 | 315 | 343 | 365 | 375 | 403 | 447 |
| 4 | 379 | 80 | 1977.3 | 268 | 285 | 301 | 331 | 365 | 397 | 408 | 432 | 455 |
| 4 | 379 | 80 | 1977.8 | 278 | 318 | 331 | 357 | 379 | 399 | 427 | 444 | 463 |
| 4 | 379 | 80 | 1978.3 | 292 | 333 | 347 | 395 | 424 | 448 | 461 | 489 | 528 |
| 4 | 382 | 32 | 1976.3 | 271 | 273 | 315 | 338 | 350 | 370 | 385 | 394 | 410 |
| 4 | 382 | 32 | 1977.3 | 301 | 308 | 331 | 353 | 369 | 408 | 421 | 446 | 479 |
| 4 | 382 | 32 | 1977.8 | 299 | 310 | 341 | 353 | 370 | 391 | 399 | 400 | 419 |
| 4 | 382 | 32 | 1978.3 | 338 | 346 | 361 | 401 | 430 | 448 | 461 | 471 | 484 |

TABLE III C

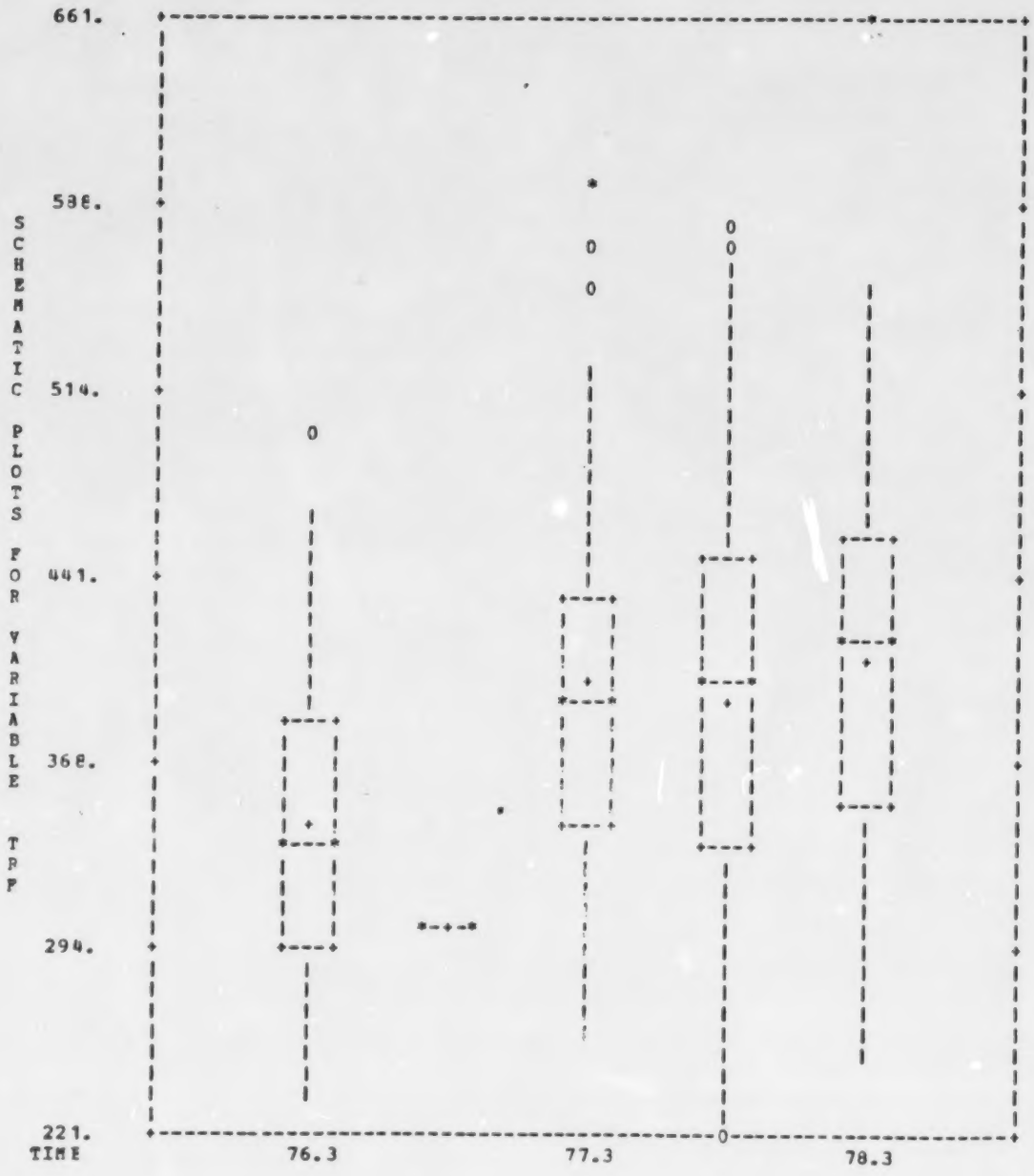
(Pages 74-109)

SCHEMATIC PLOTS OF DISTRIBUTIONS OF TOTAL READING AND TOTAL MATHEMATICS SCORES BY TIME FOR EACH SCHOOL IN EACH TREATMENT GROUP IN EACH COHORT

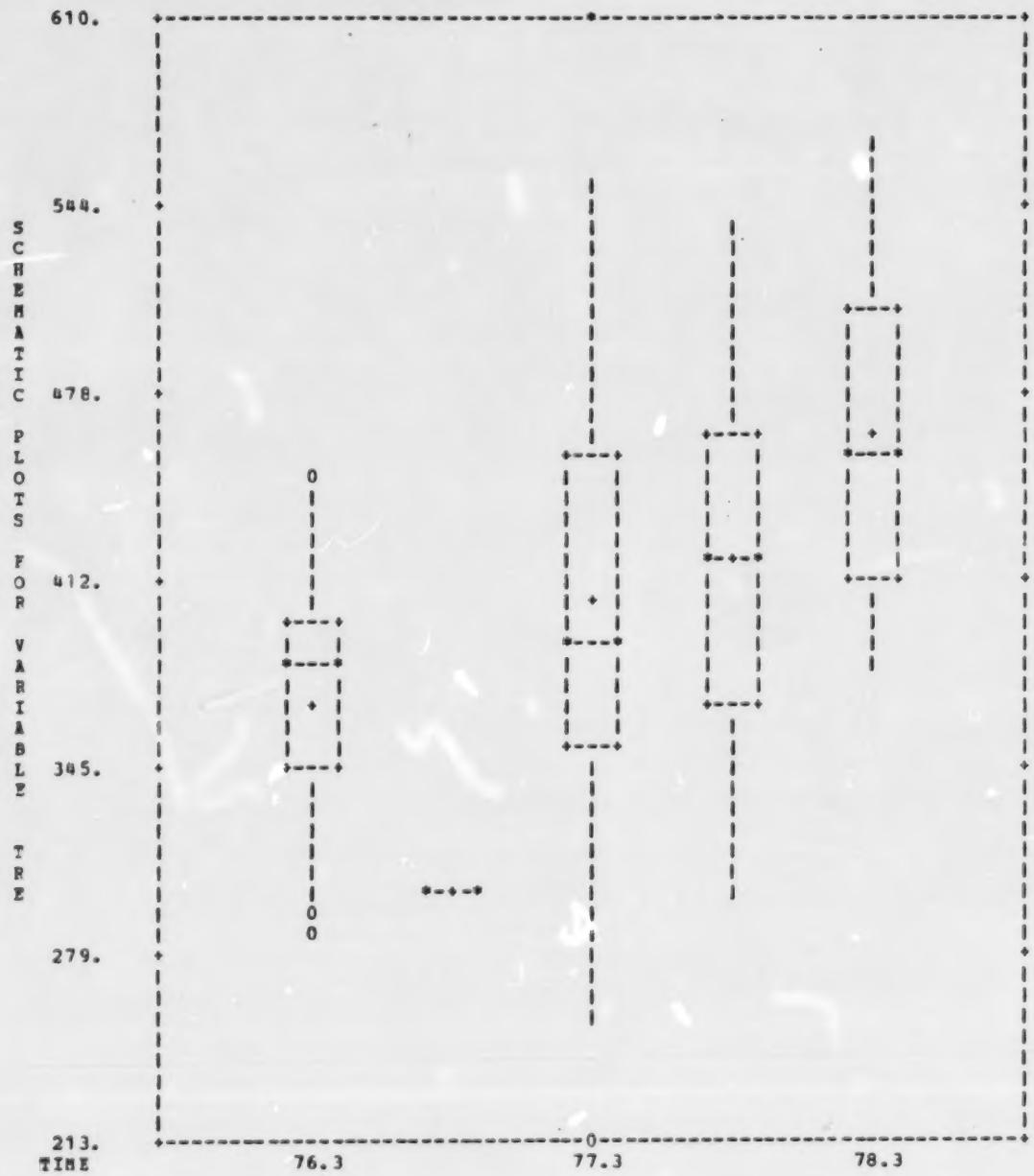
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 1
COHORT=3 NOSCH=302



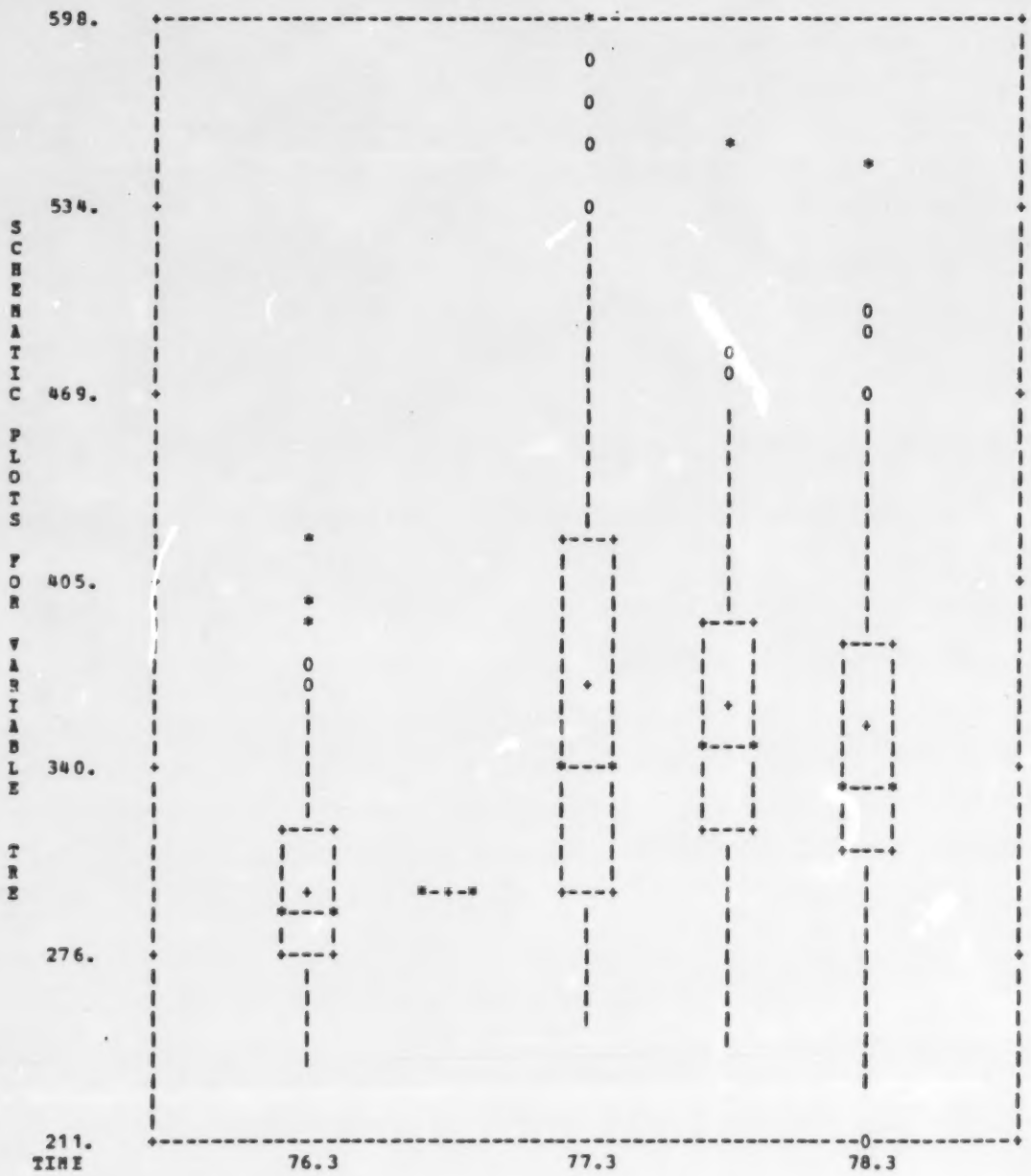
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 2
COHORT=3 NOSCH=309



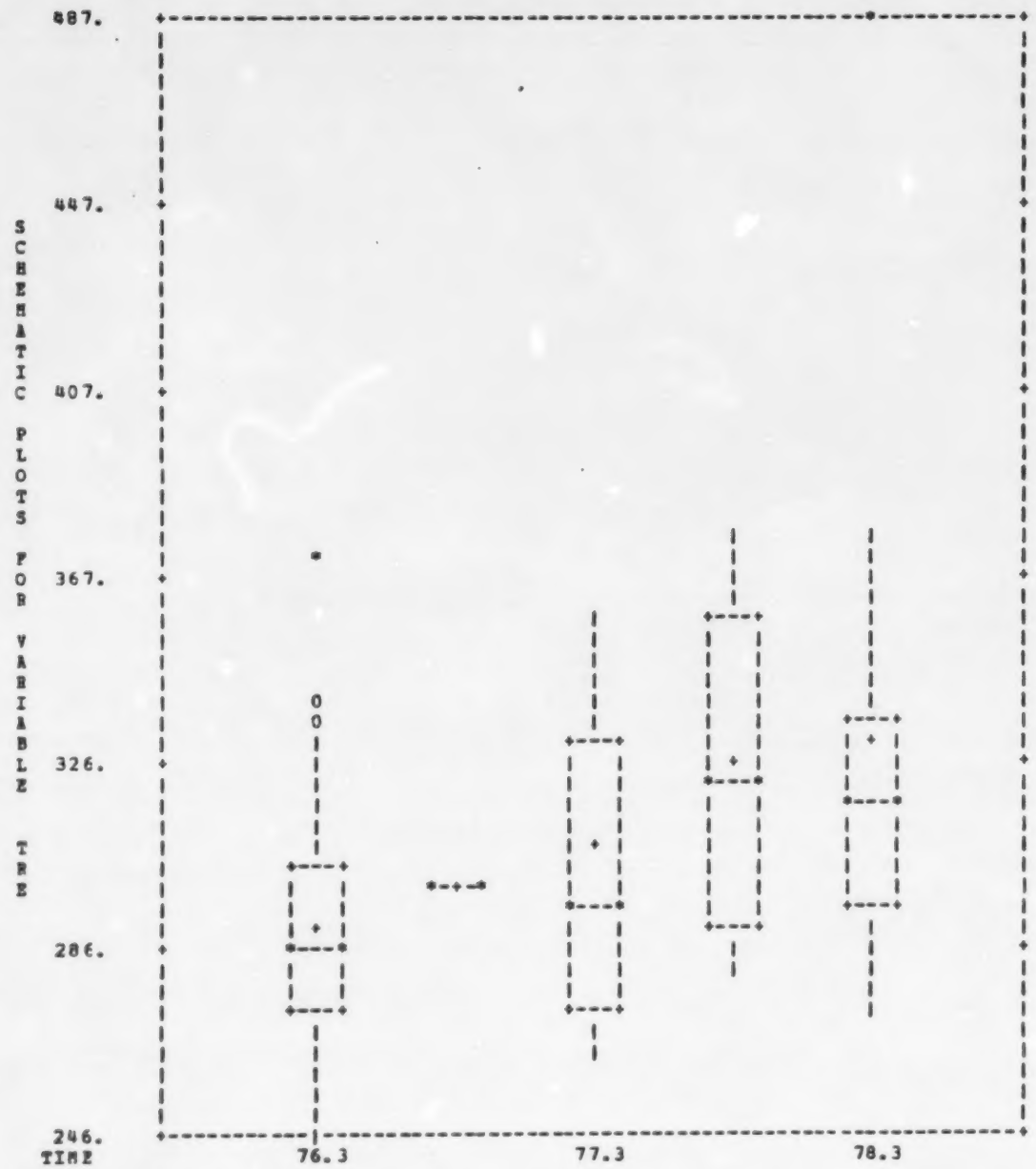
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 3
COHORT=3 NOSCH=320



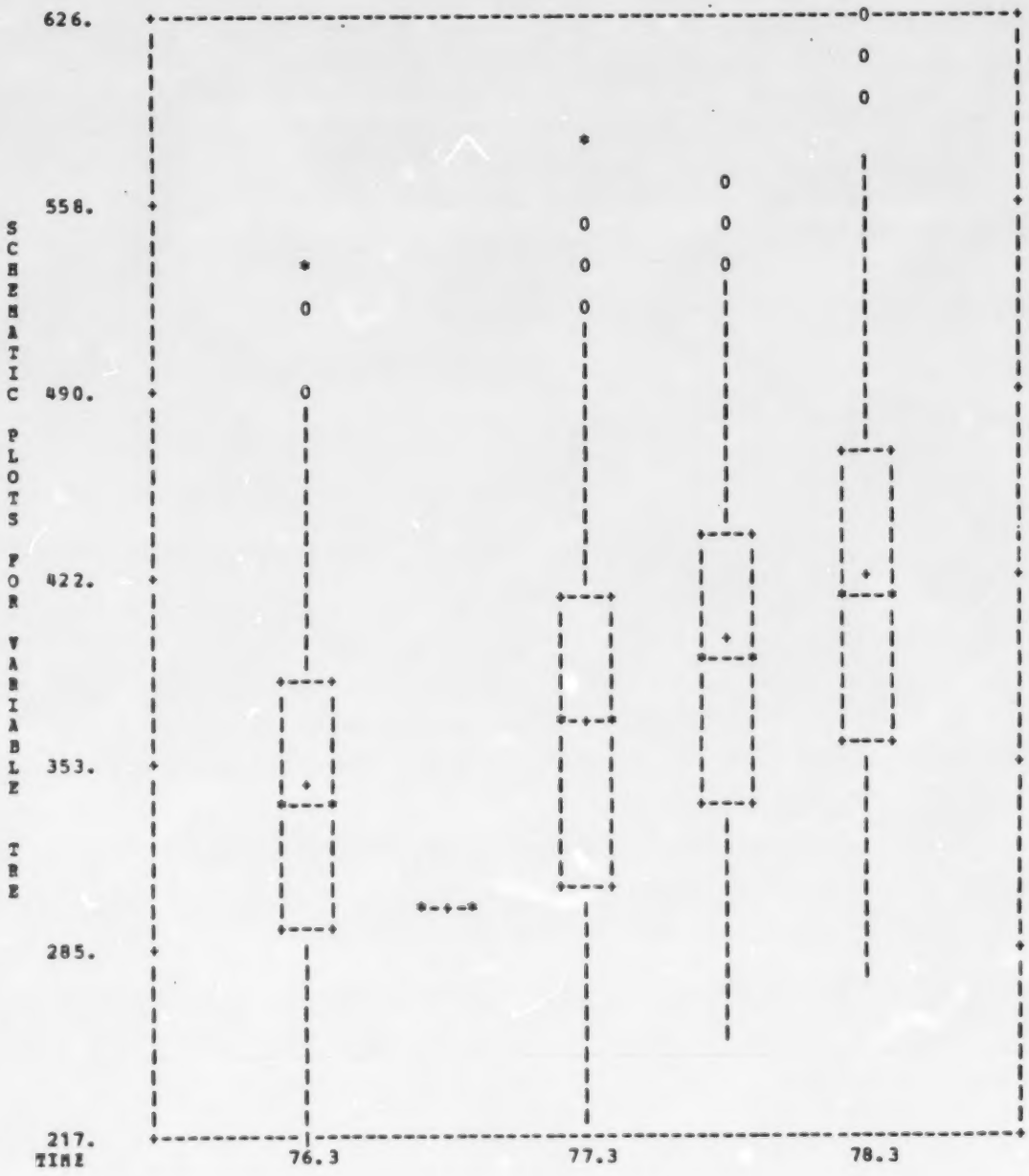
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME
COHORT=3 NOSCH=322



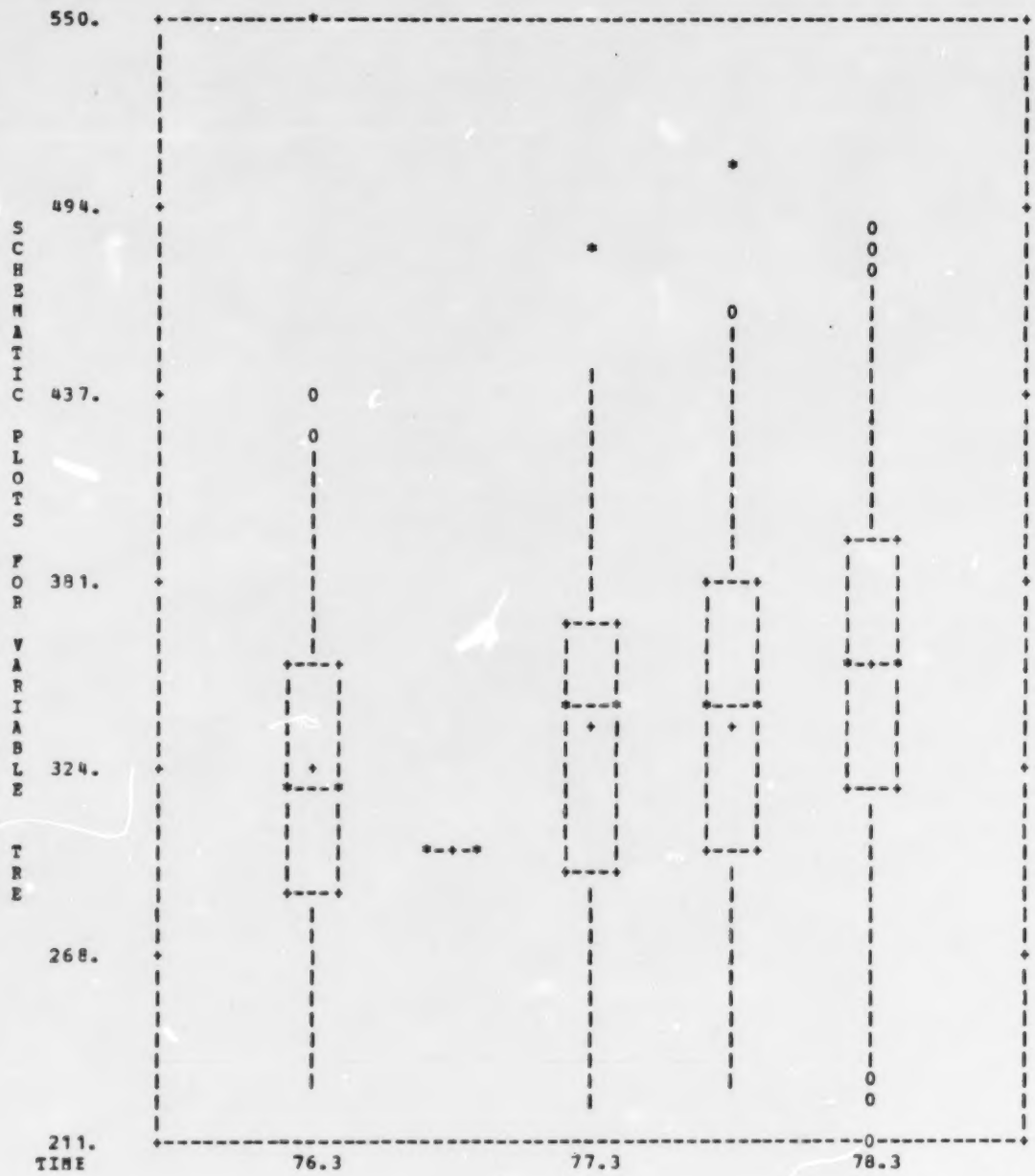
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 5
COHORT=3 NOSCH=334



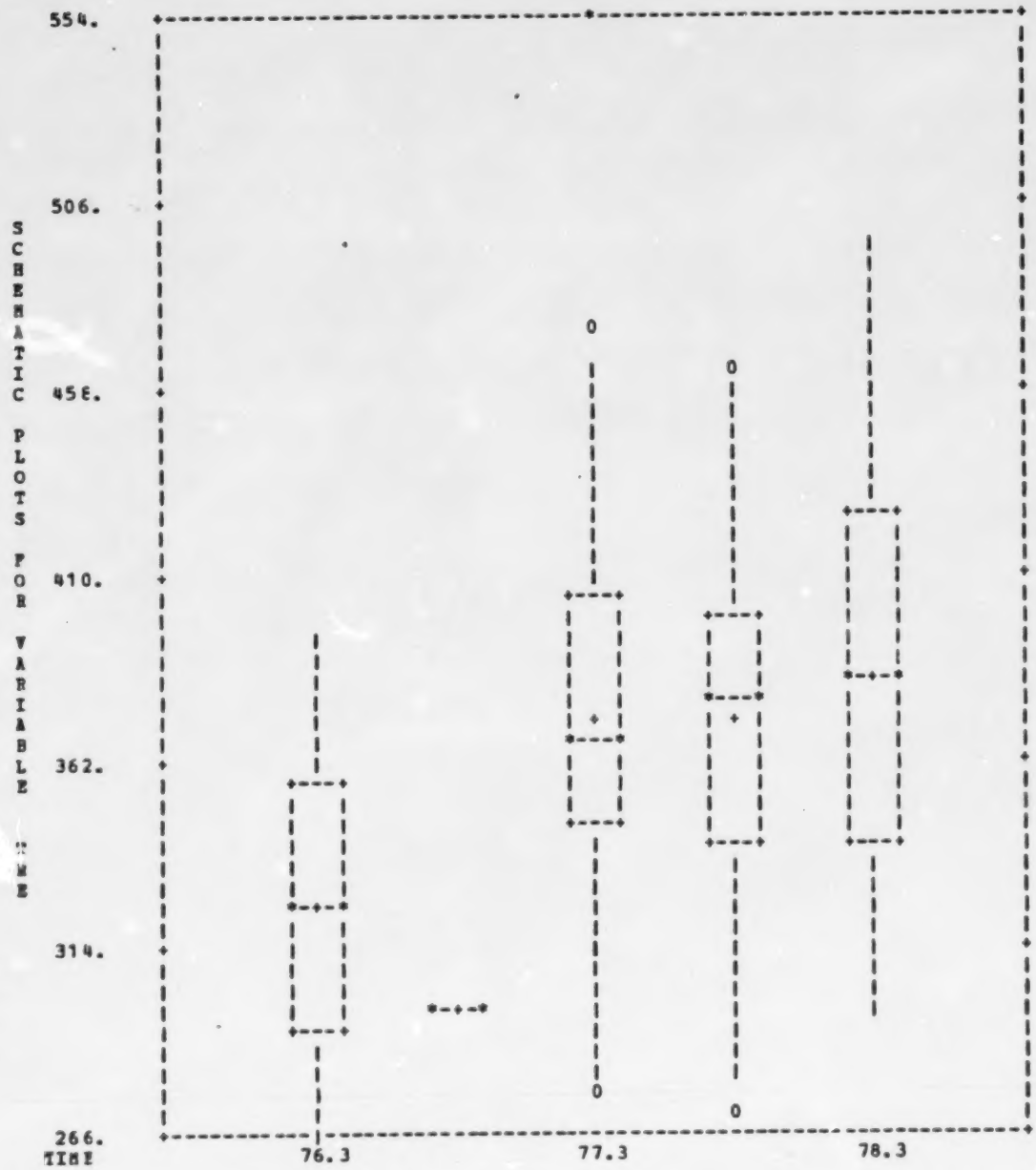
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 6
COHORT=3 NOSCH=344



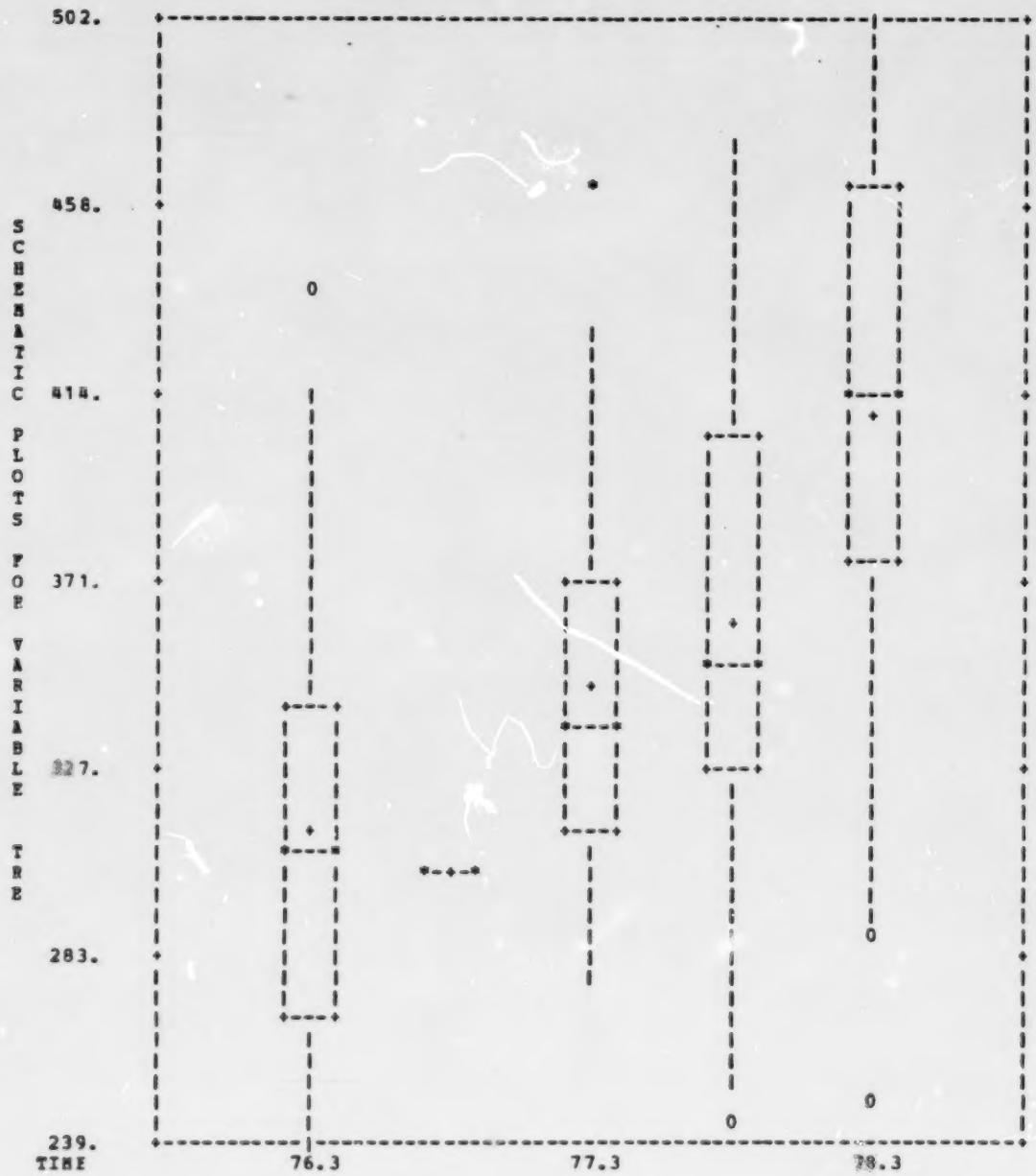
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 7
COHORT=3 NOSCH=379



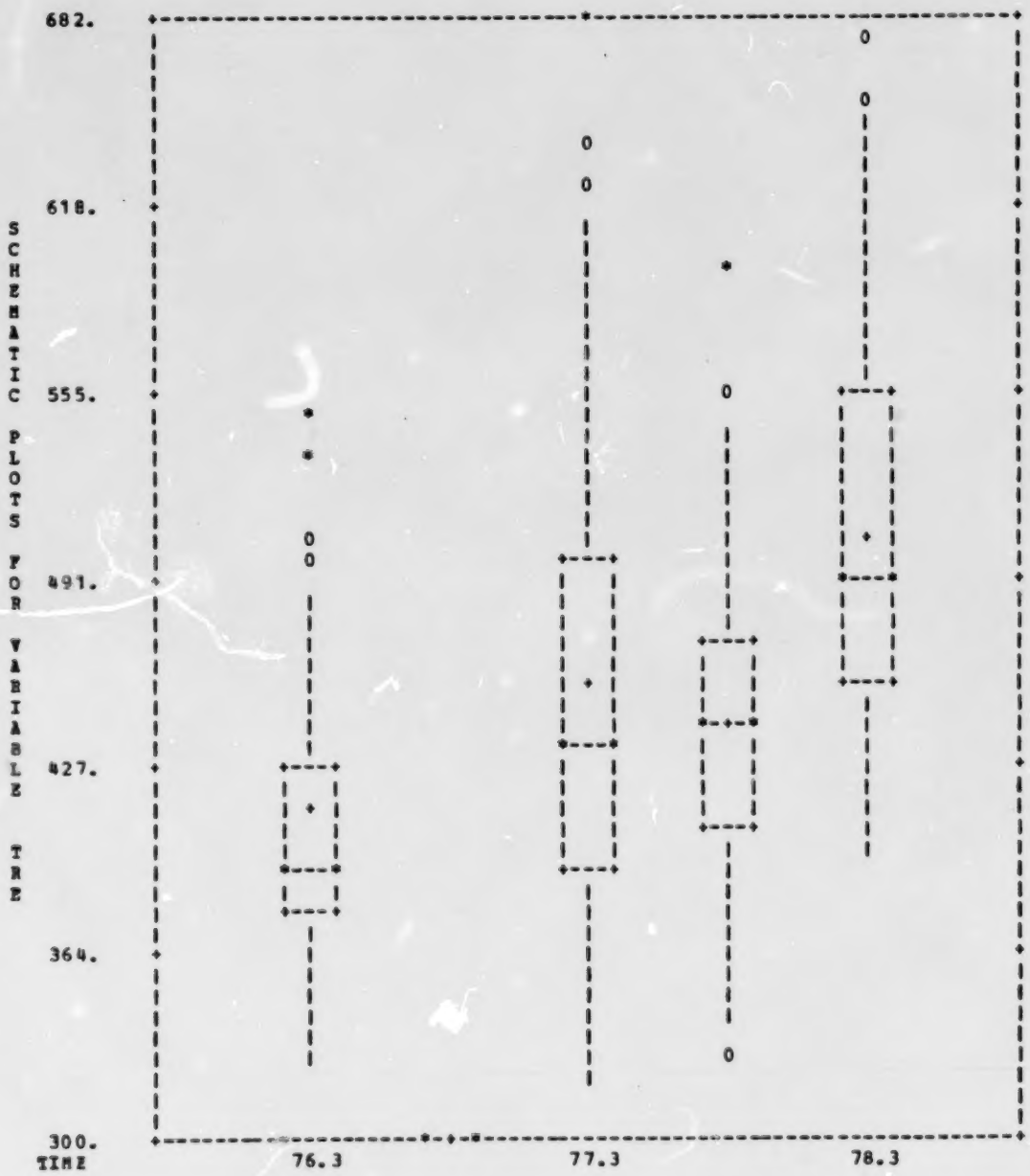
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 8
COHORT=3 NOSCH=382



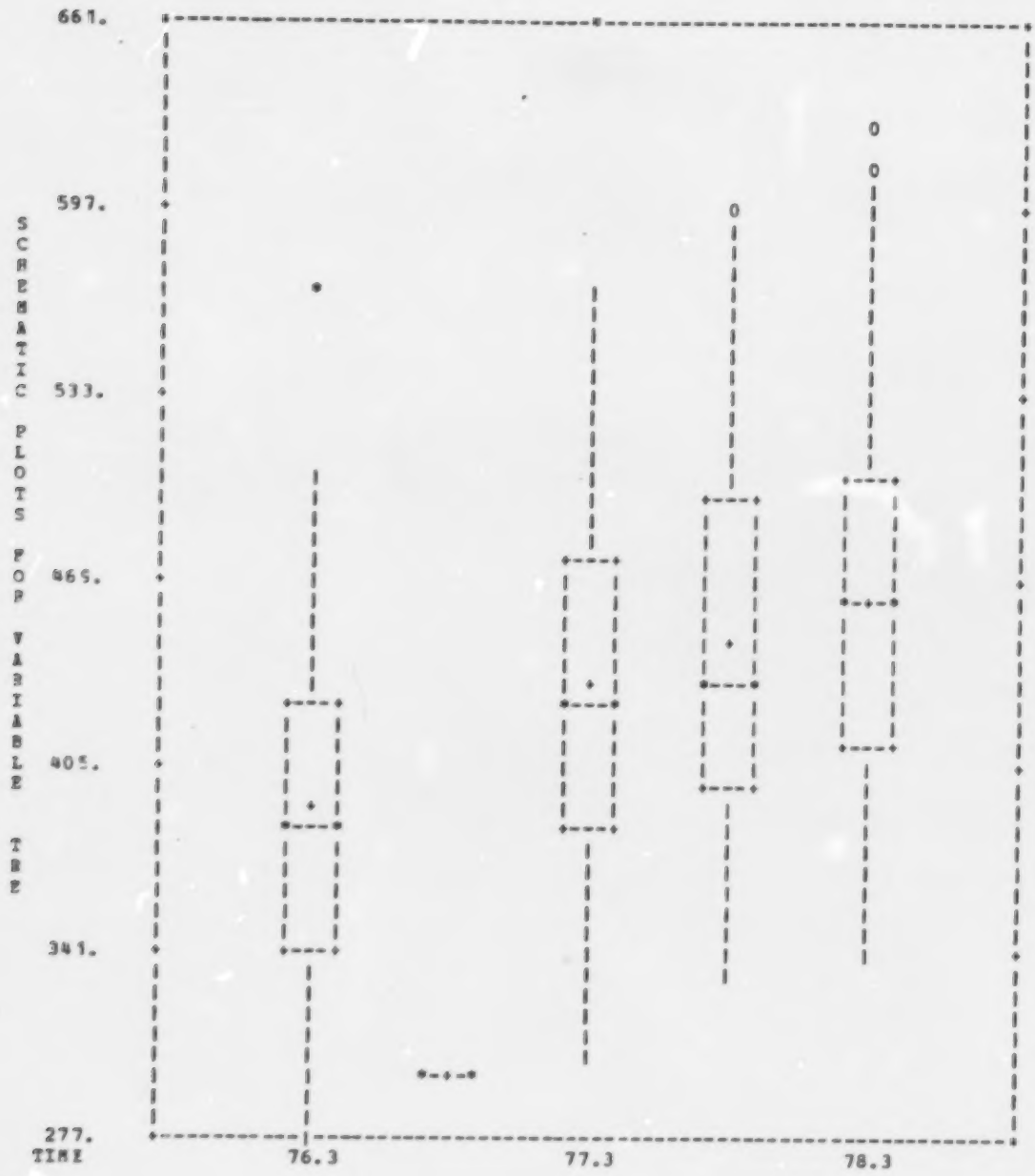
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 9
COHORT=3 NOSCH=395



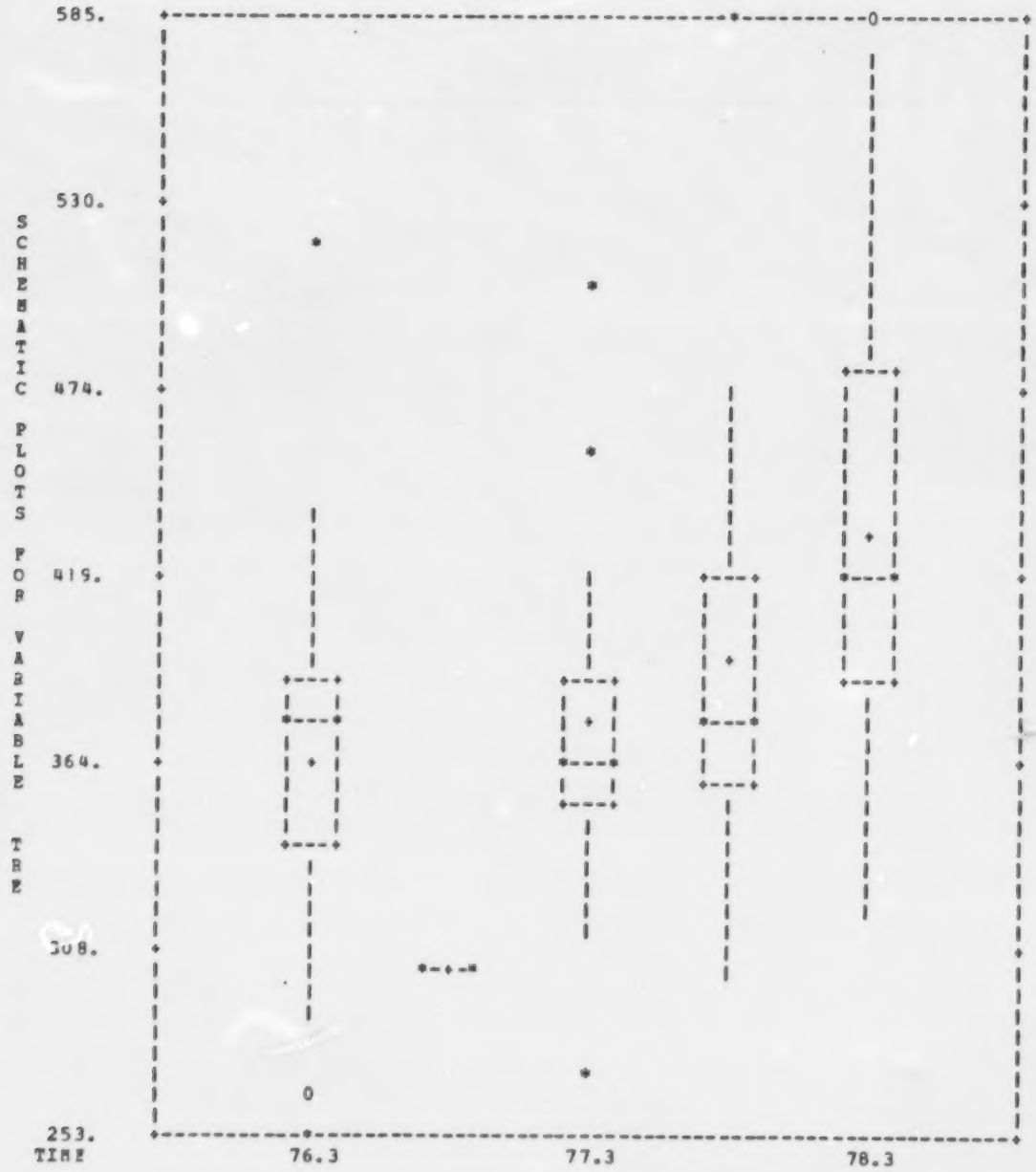
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 10
COHORT=4 NOSCH=302



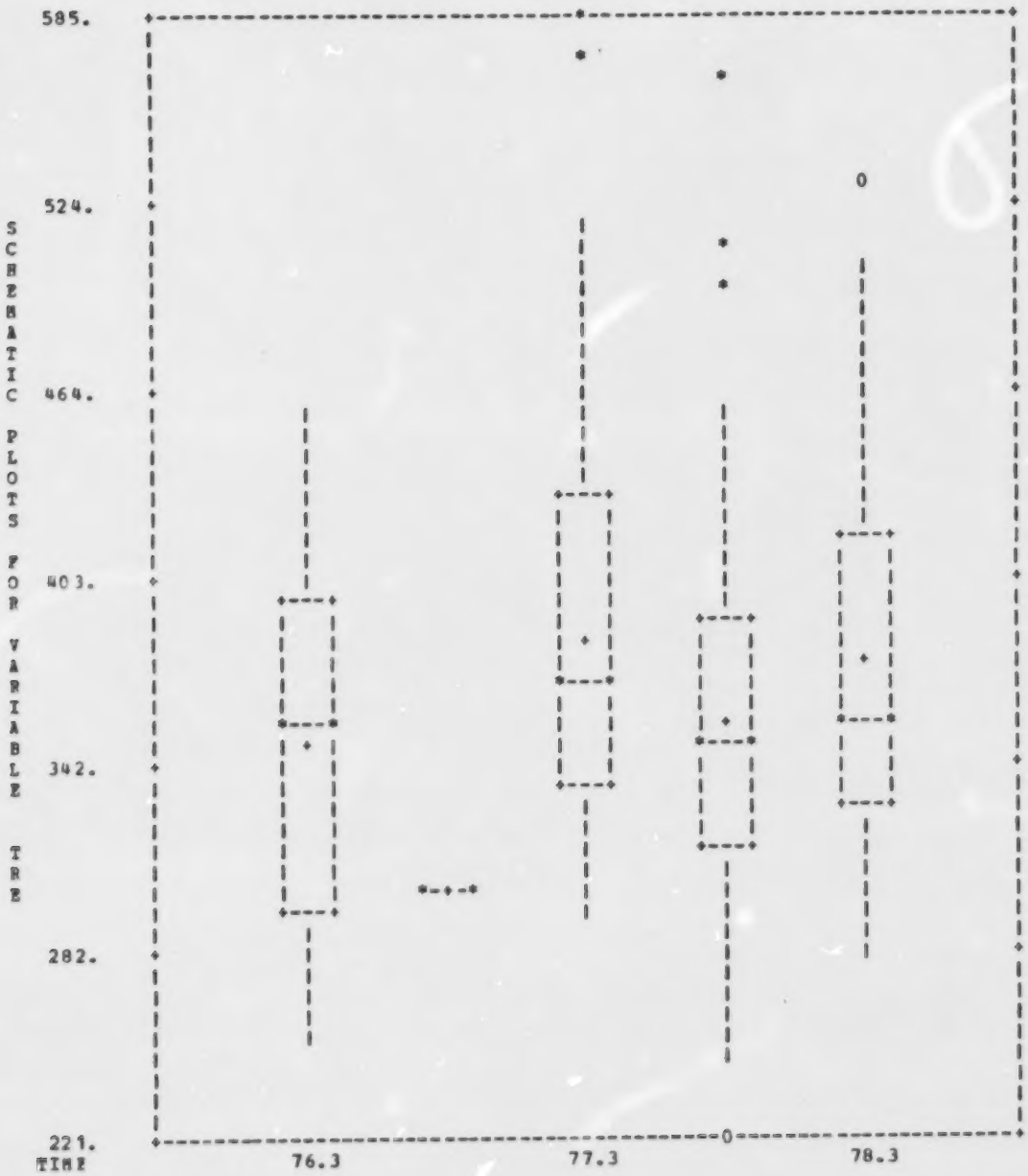
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 11
COHORT=4 NOSCH=309



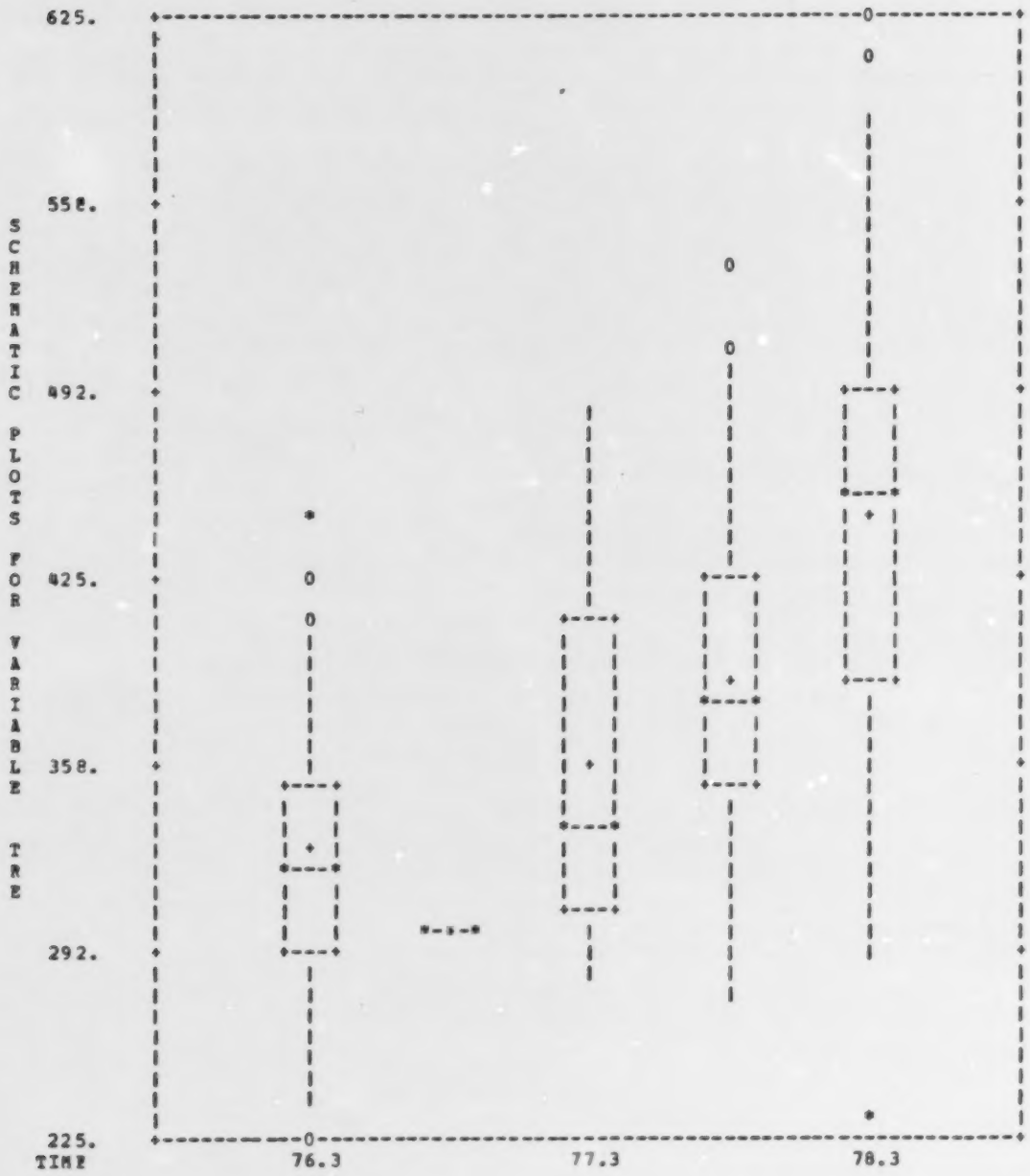
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 12
COHORT=4 NOSCH=320



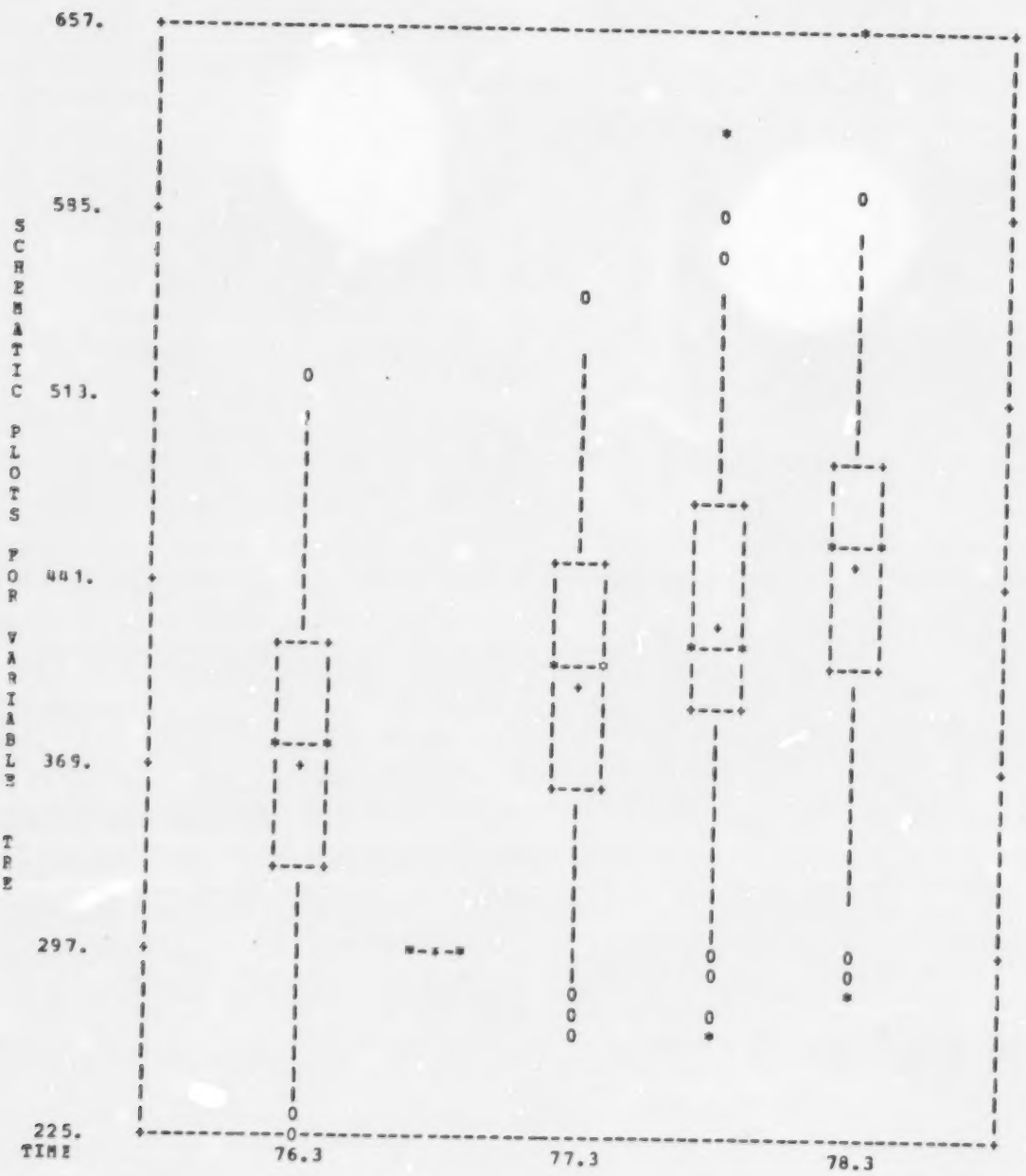
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 13
COHORT=4 NOSCH=322



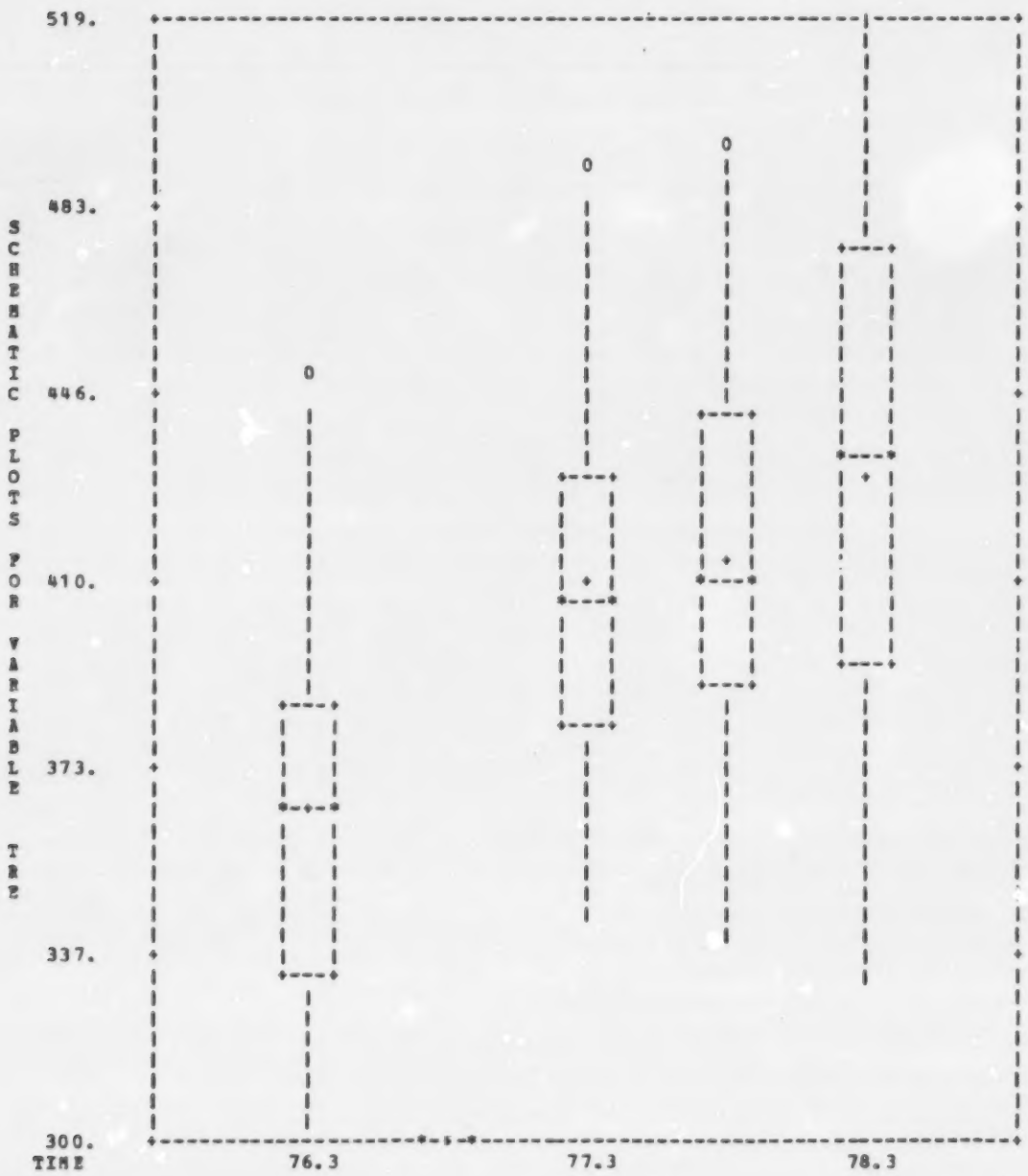
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 14
COHORT=4 NOSCH=334



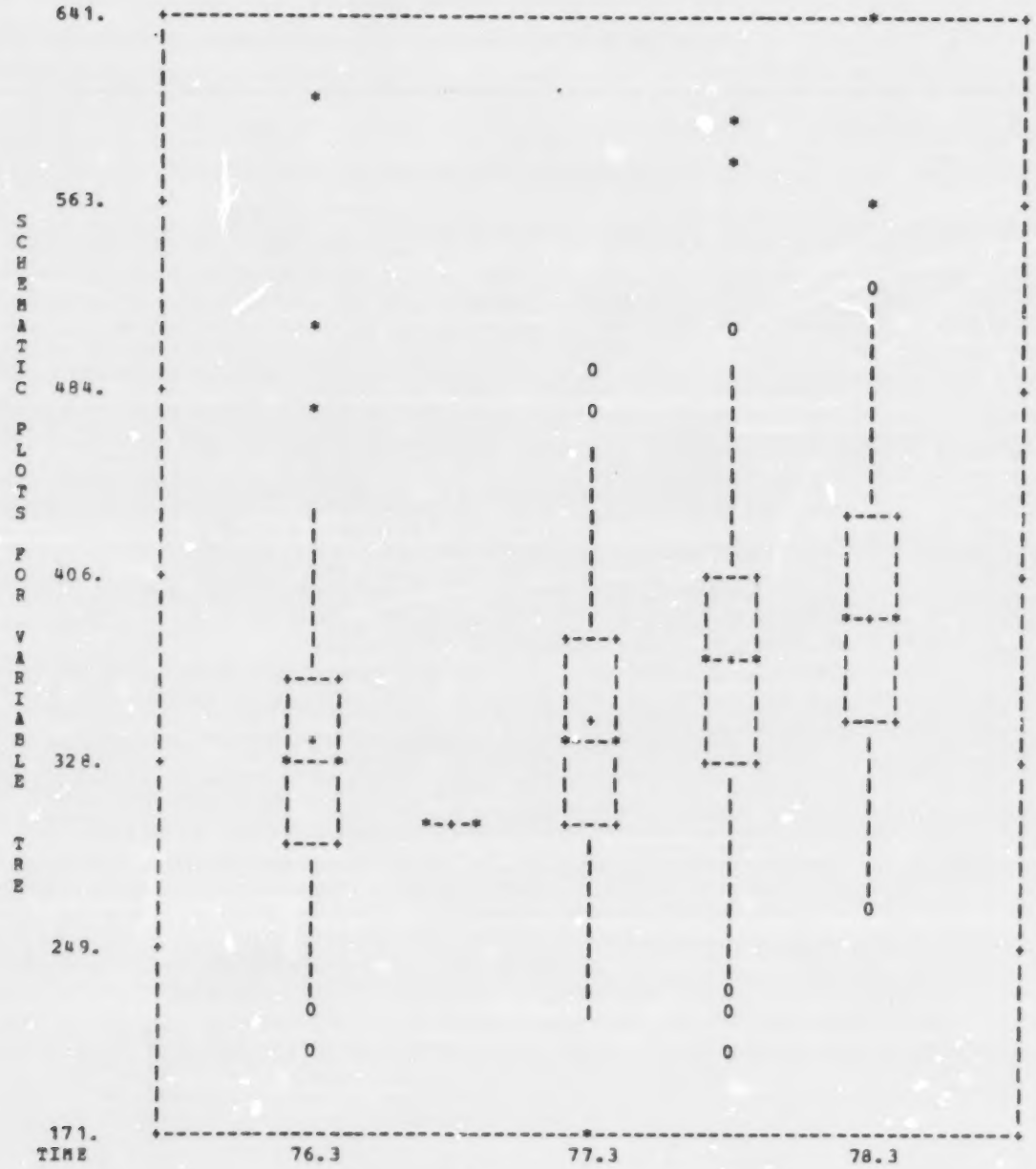
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 15
COHORT=4 NOSCH=344



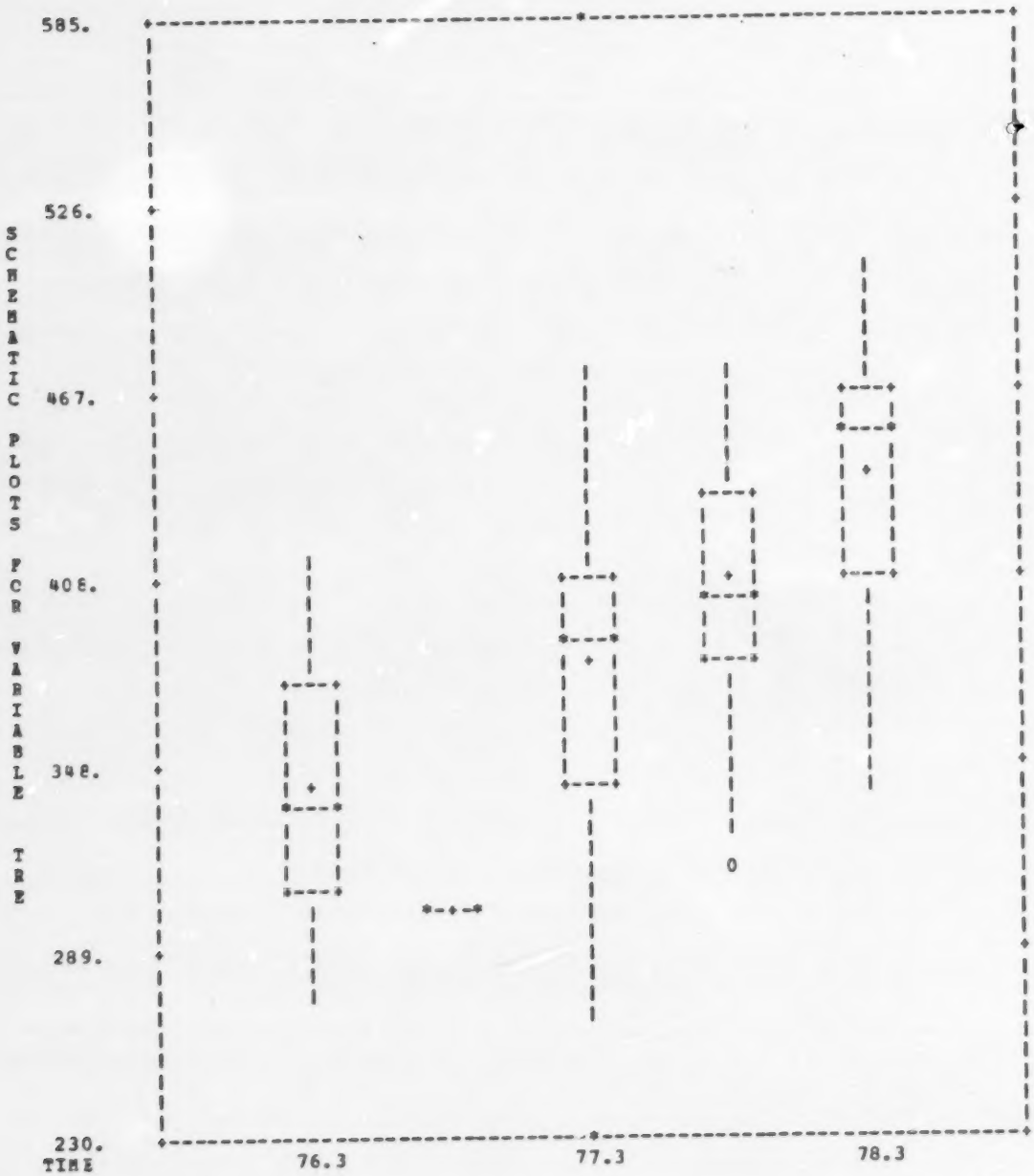
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 16
COHORT=4 NOSCH=368



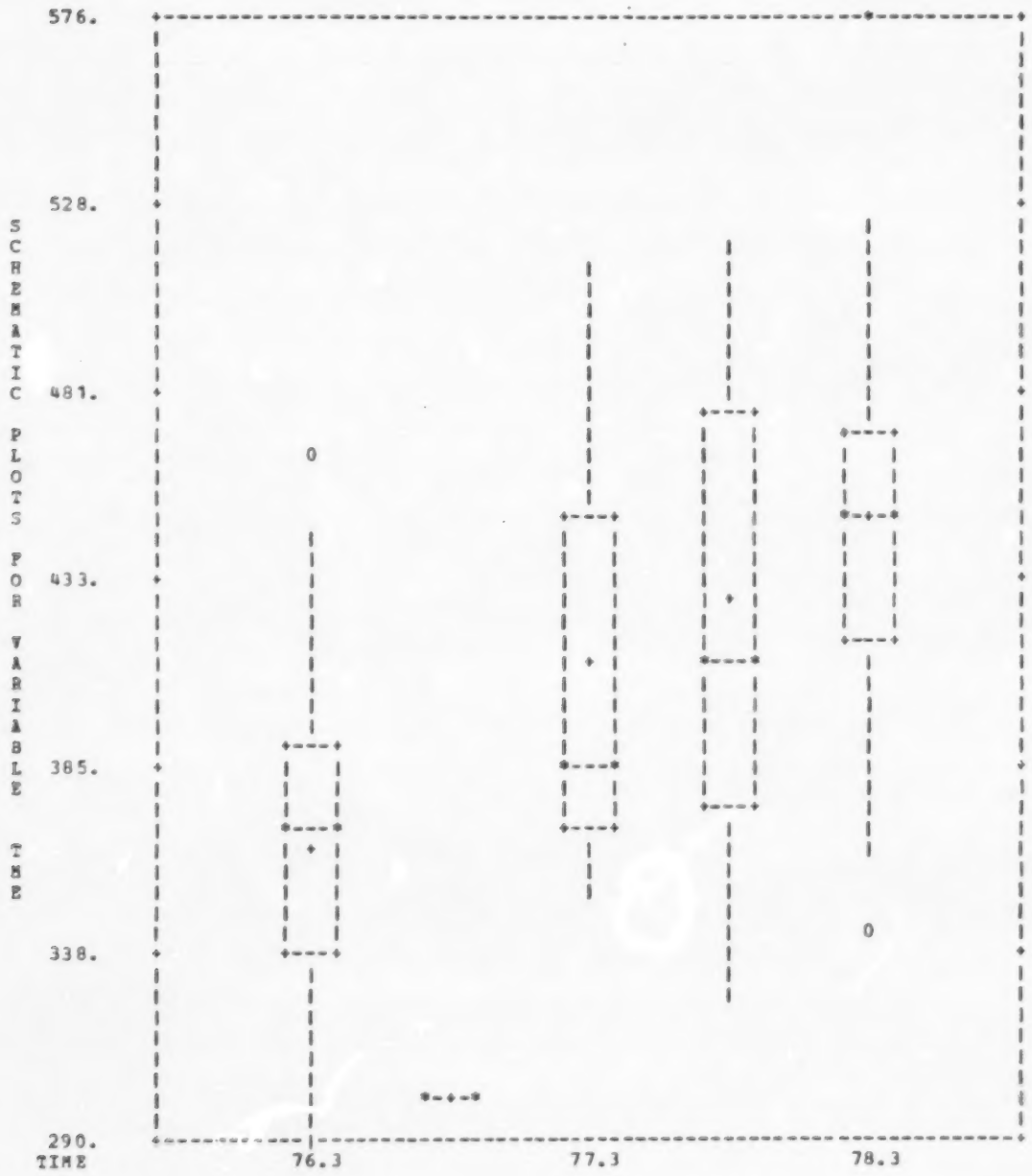
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 17
COHORT=4 NOSCH=379



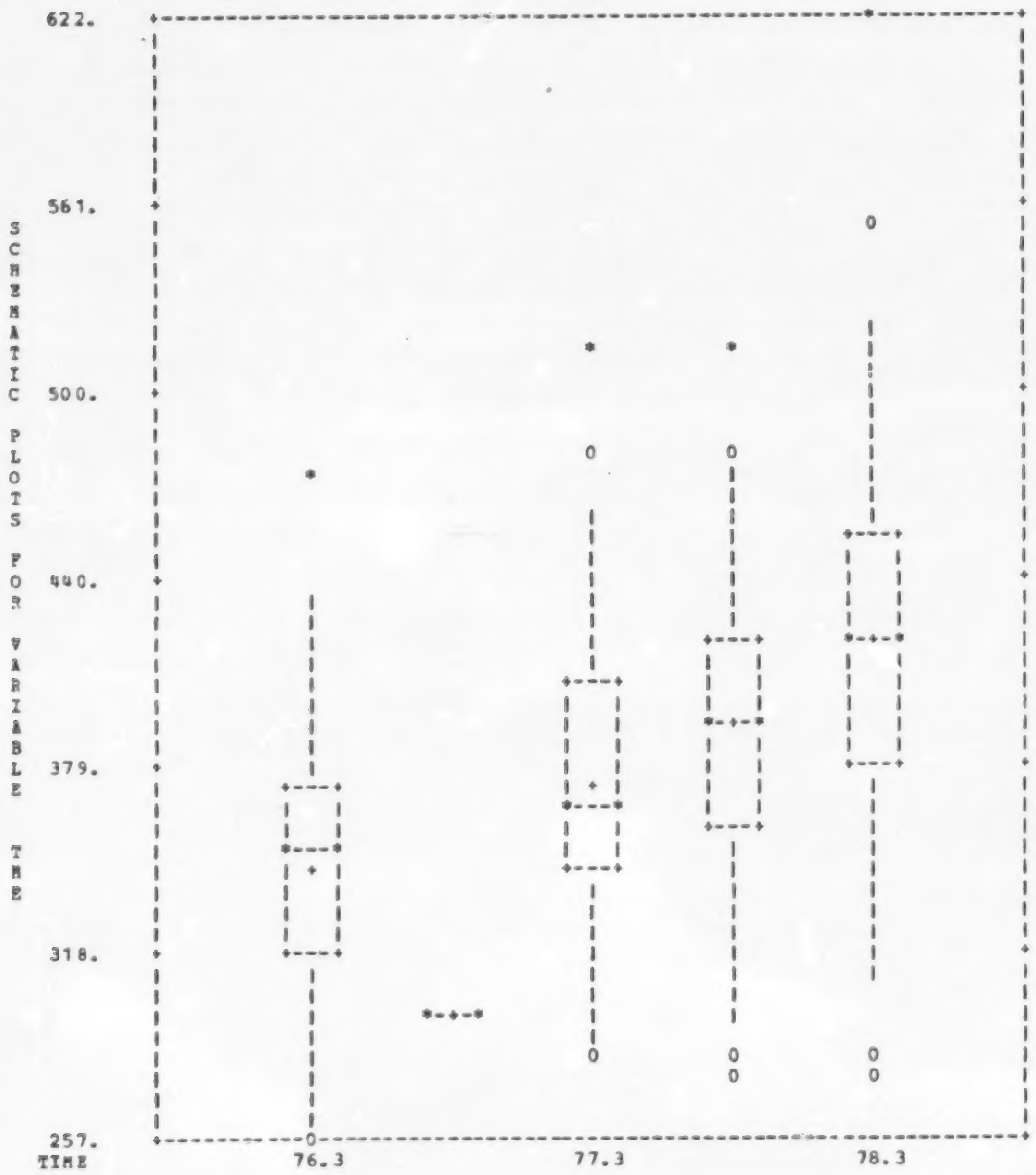
SCHEMATIC PLOT OF TOTAL READING EXPANDED STANDARD SCORES (TRE) BY TIME 18
COHORT=4 NOSCH=382



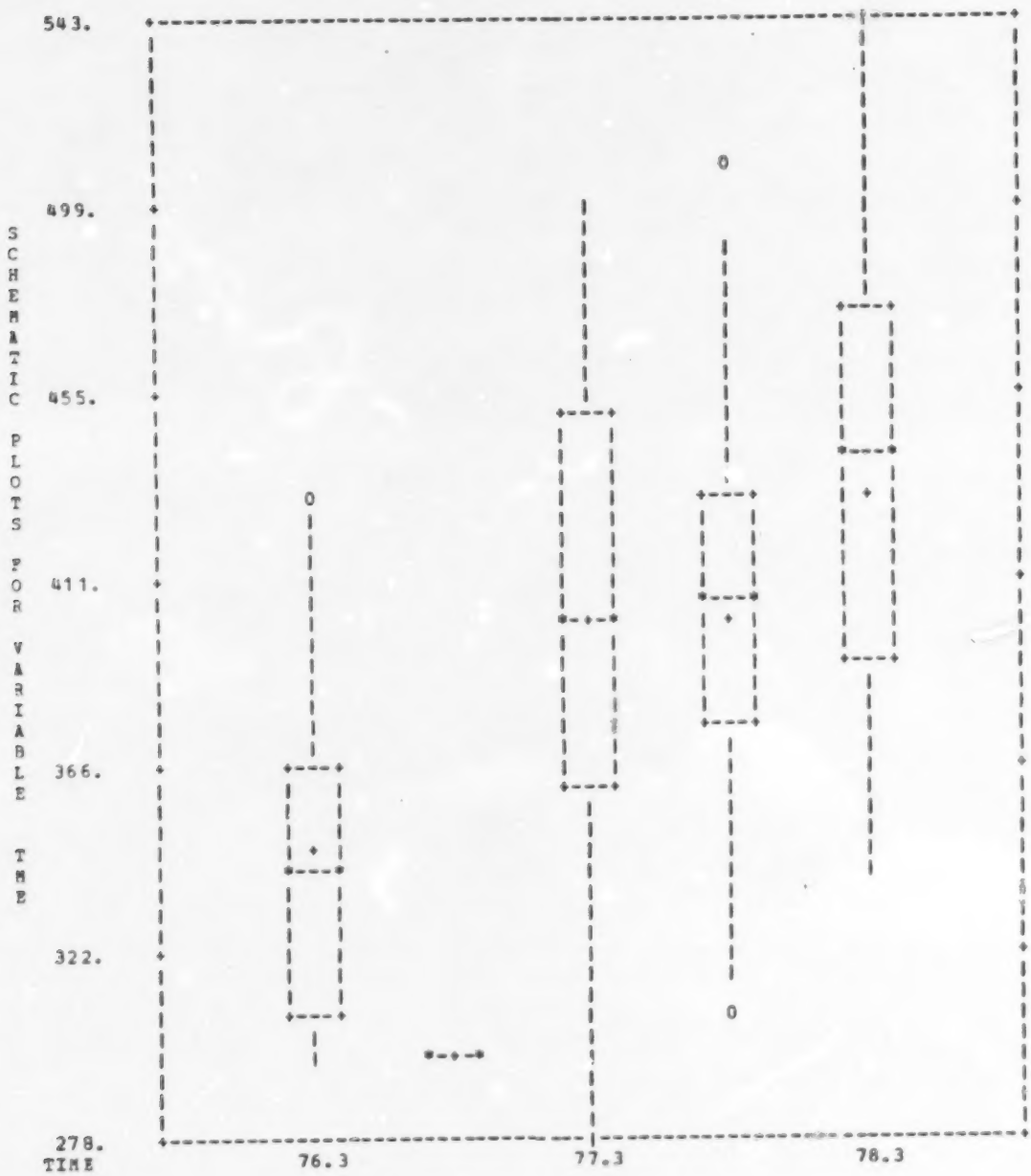
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 1
COHORT=3 NOSCH=302



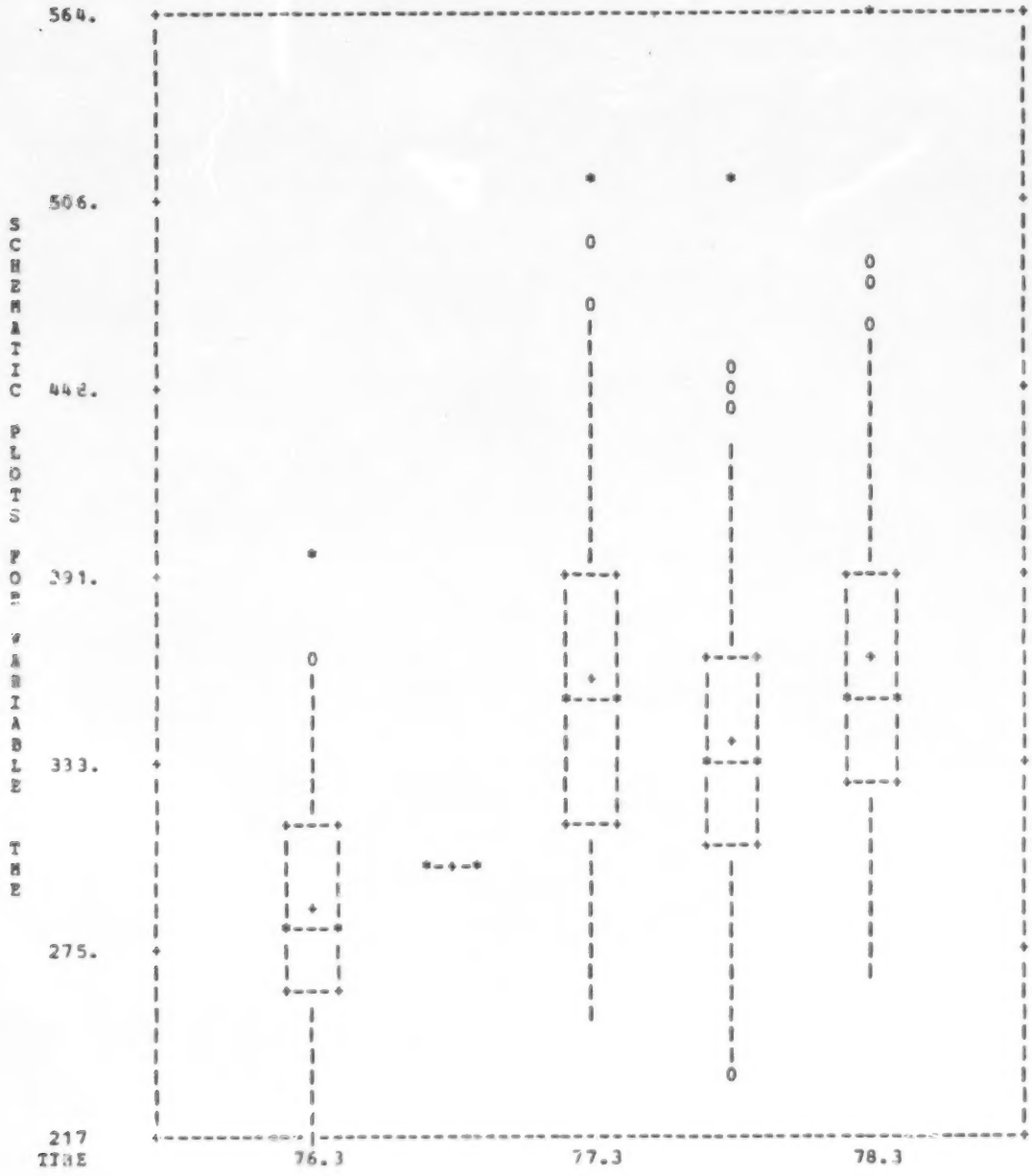
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 2
COHORT=3 NOSCH=309



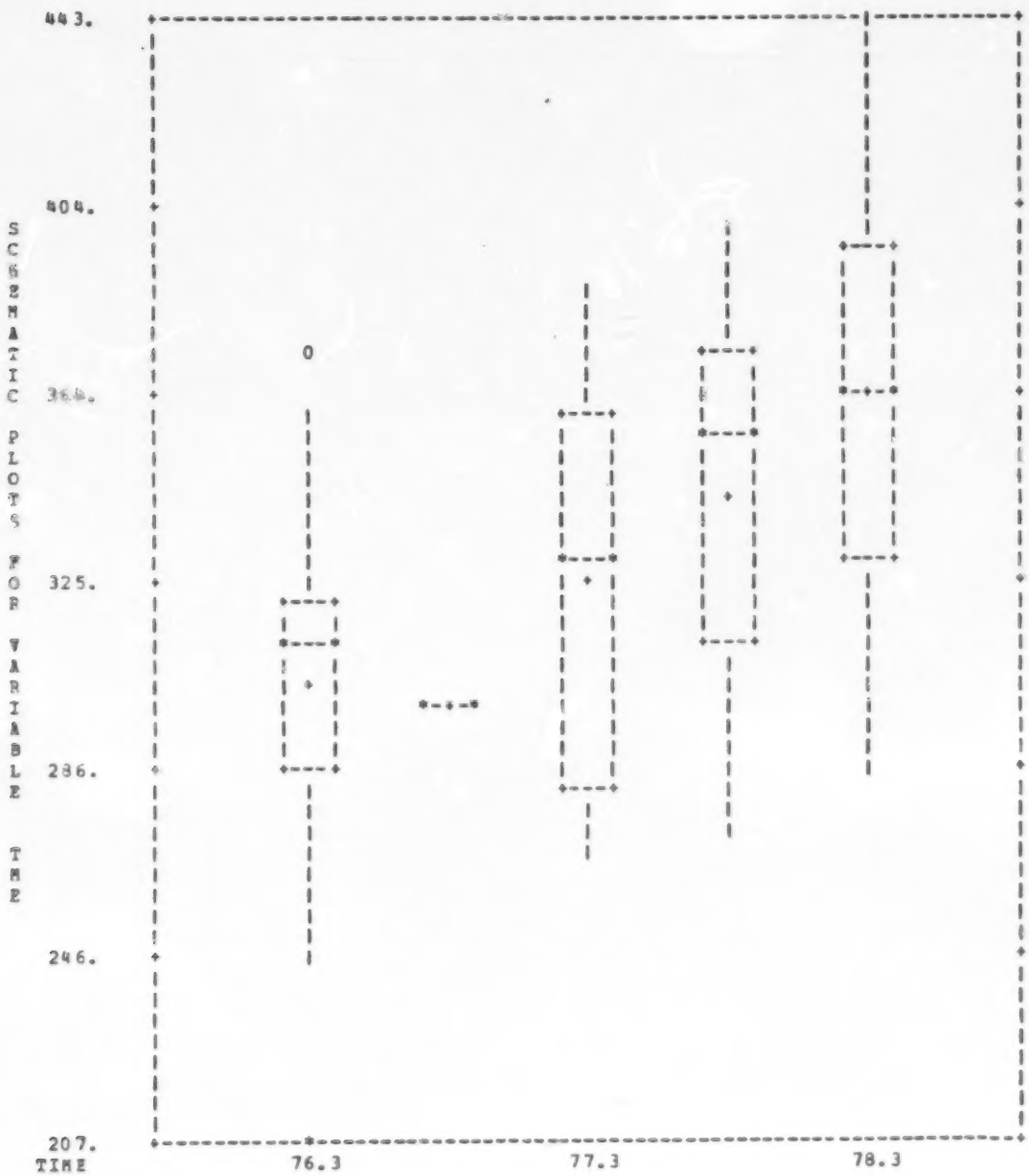
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 3
COHORT=3 NOSCH=320



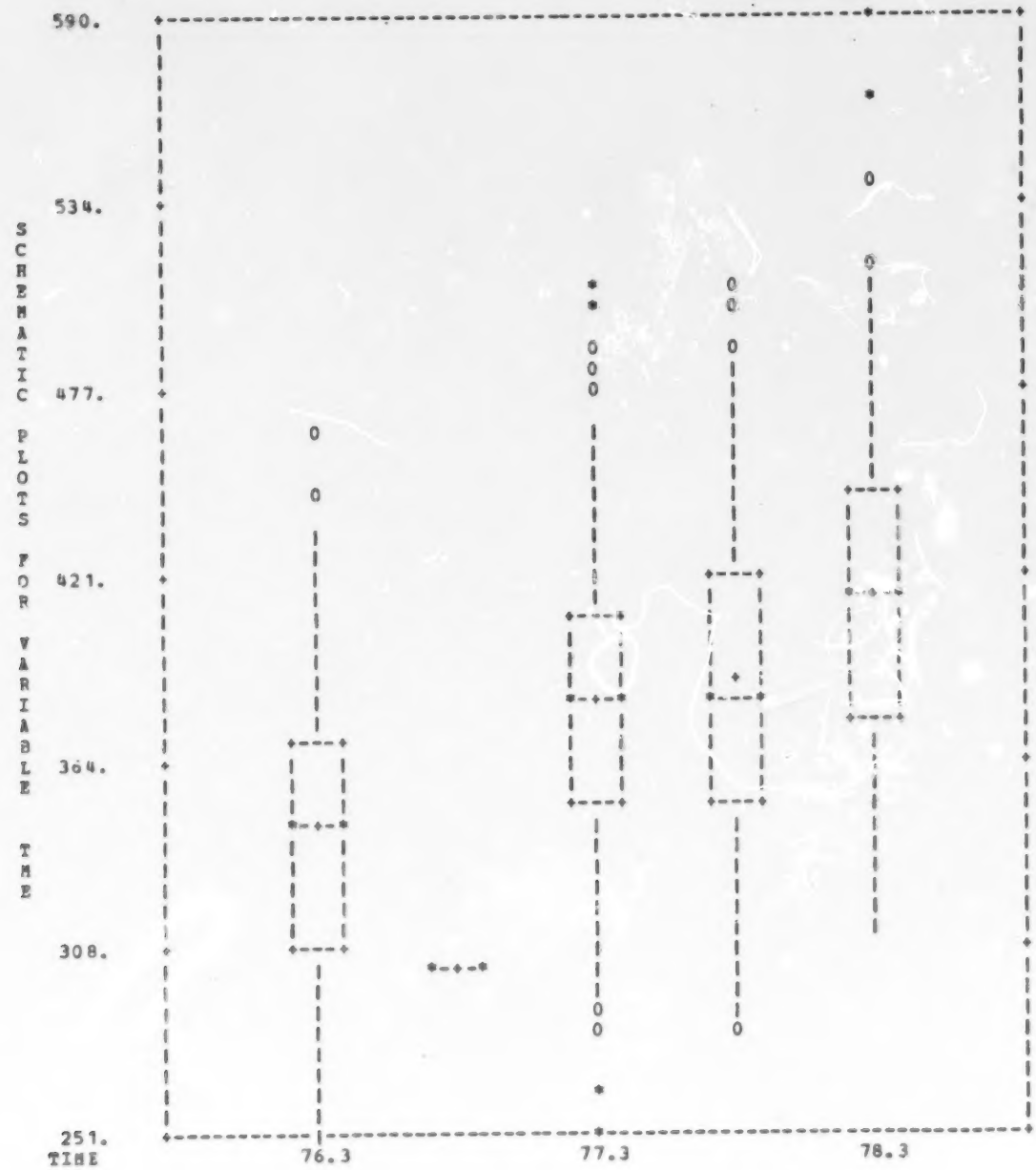
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 4
COHORT=3 NOSCH=322



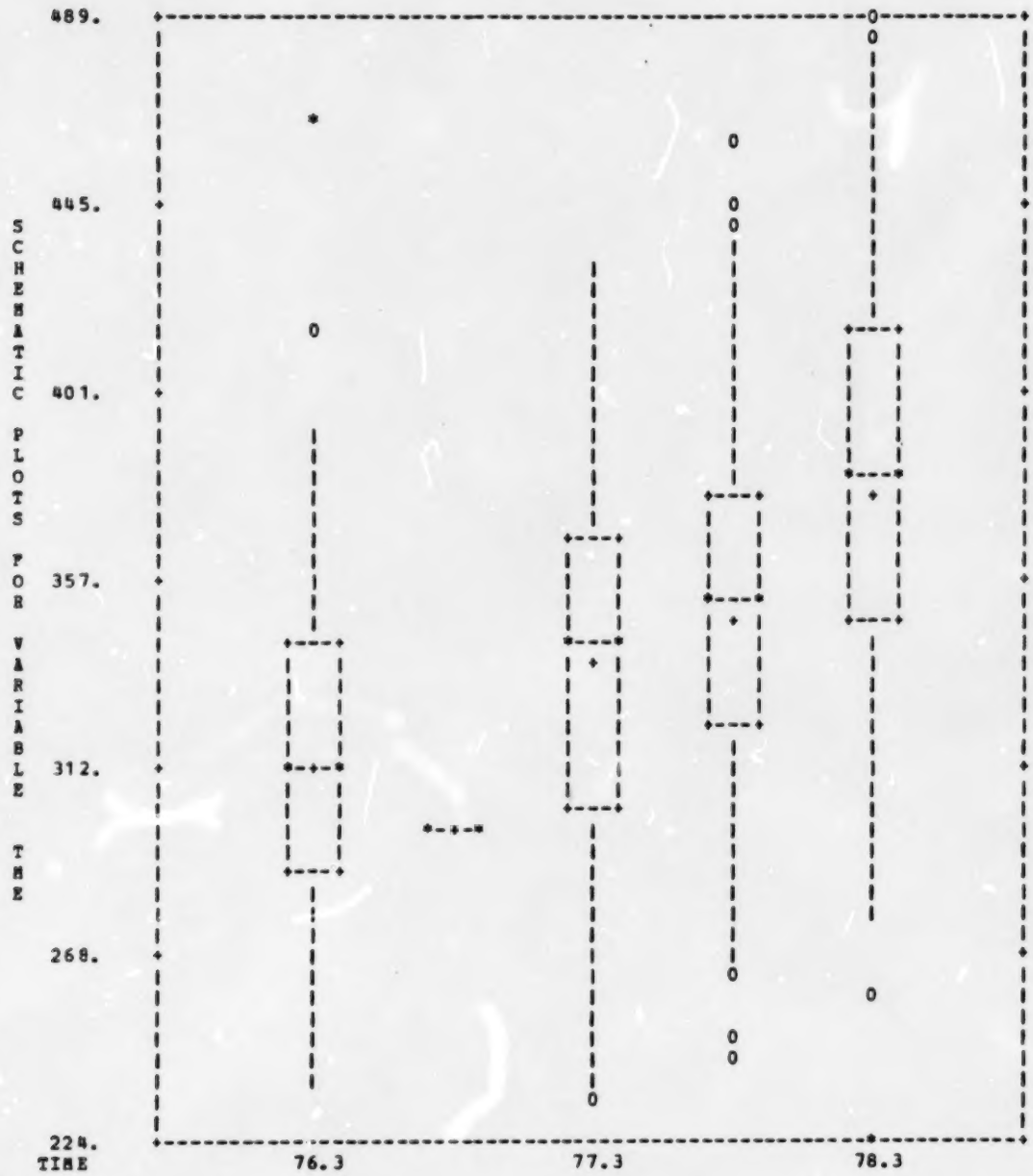
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 5
COHORT=3 NOSCH=334



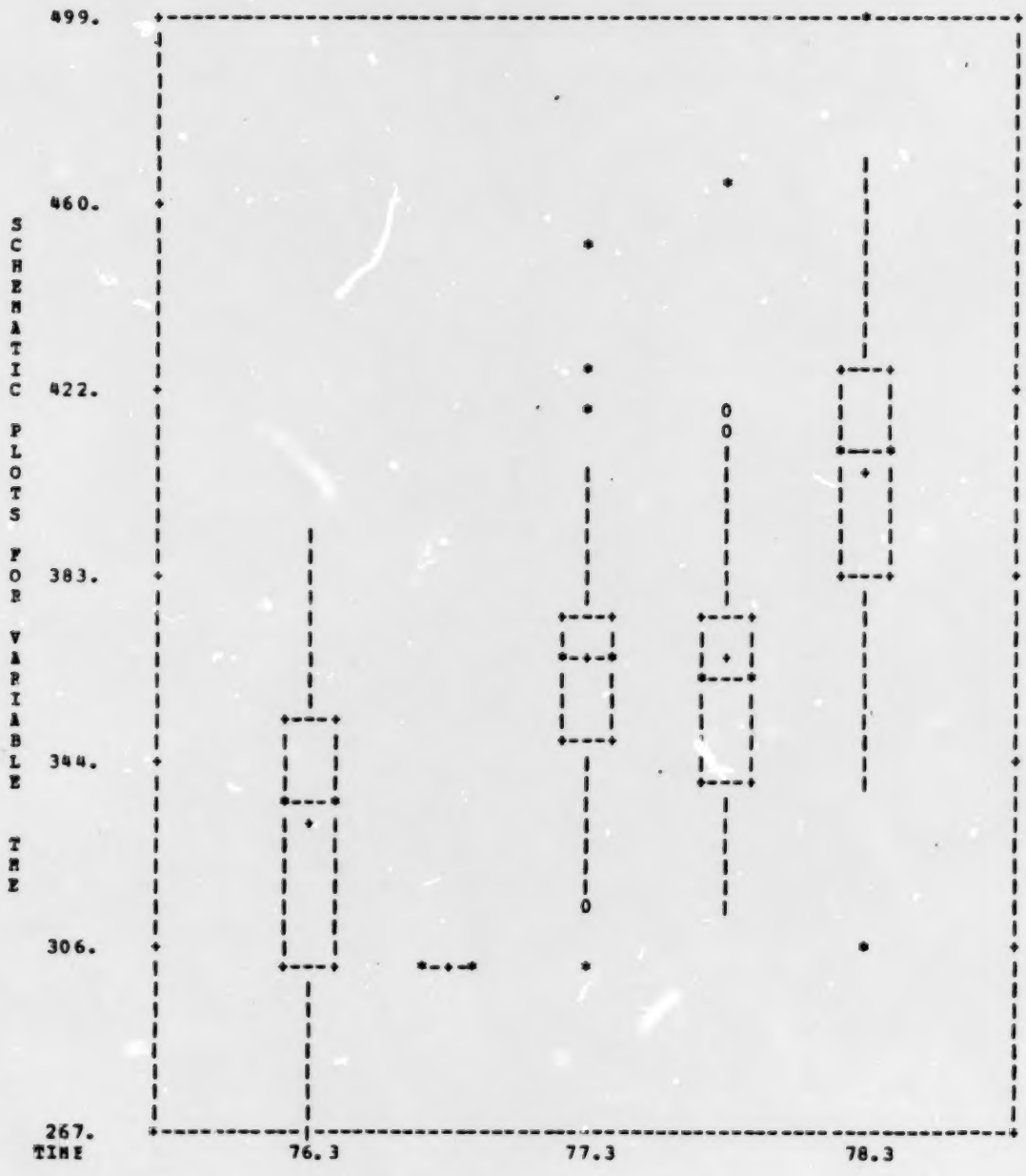
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 6
COHORT=3 NOSCH=344



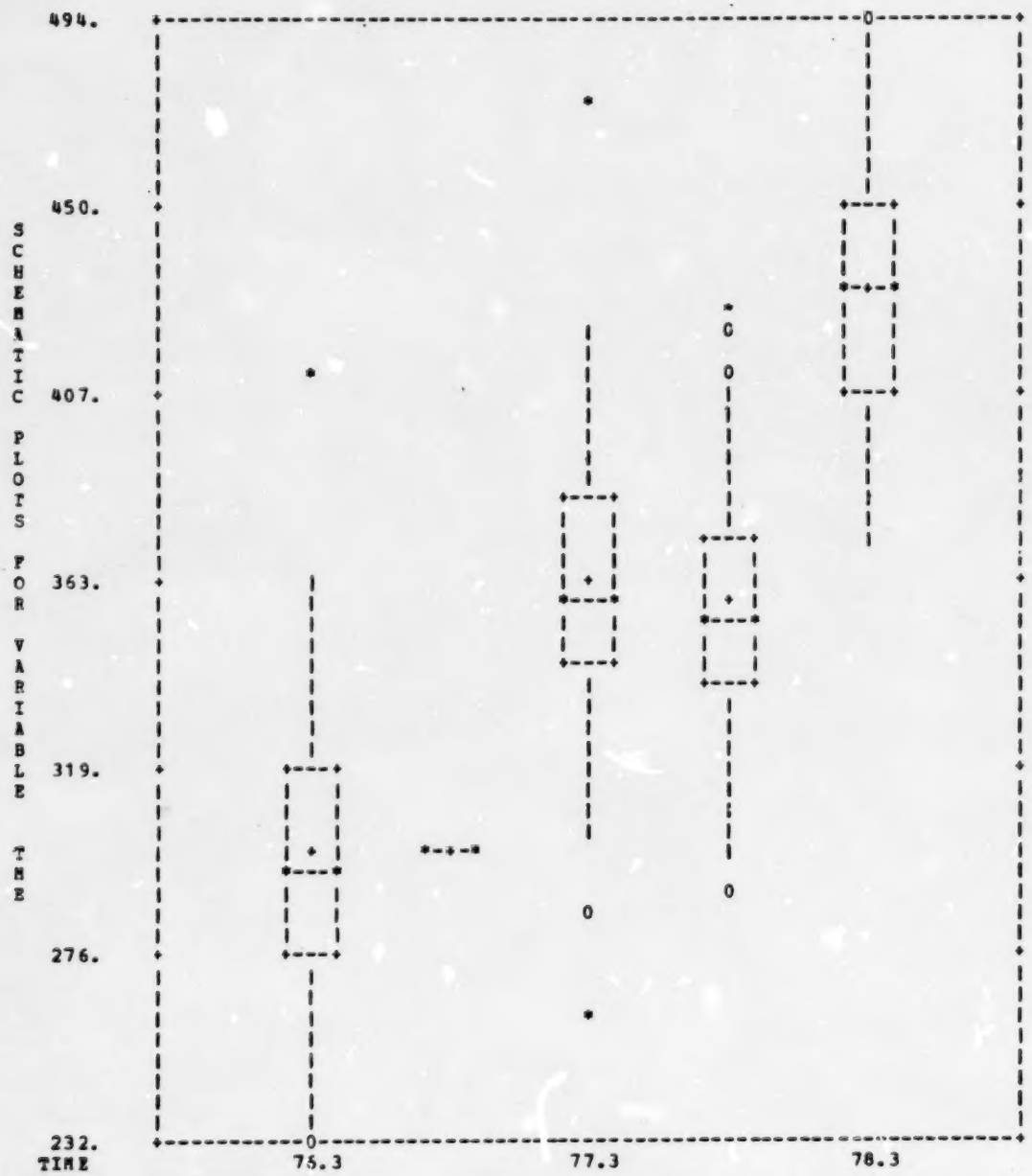
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 7
COHORT=3 MOSCH=379



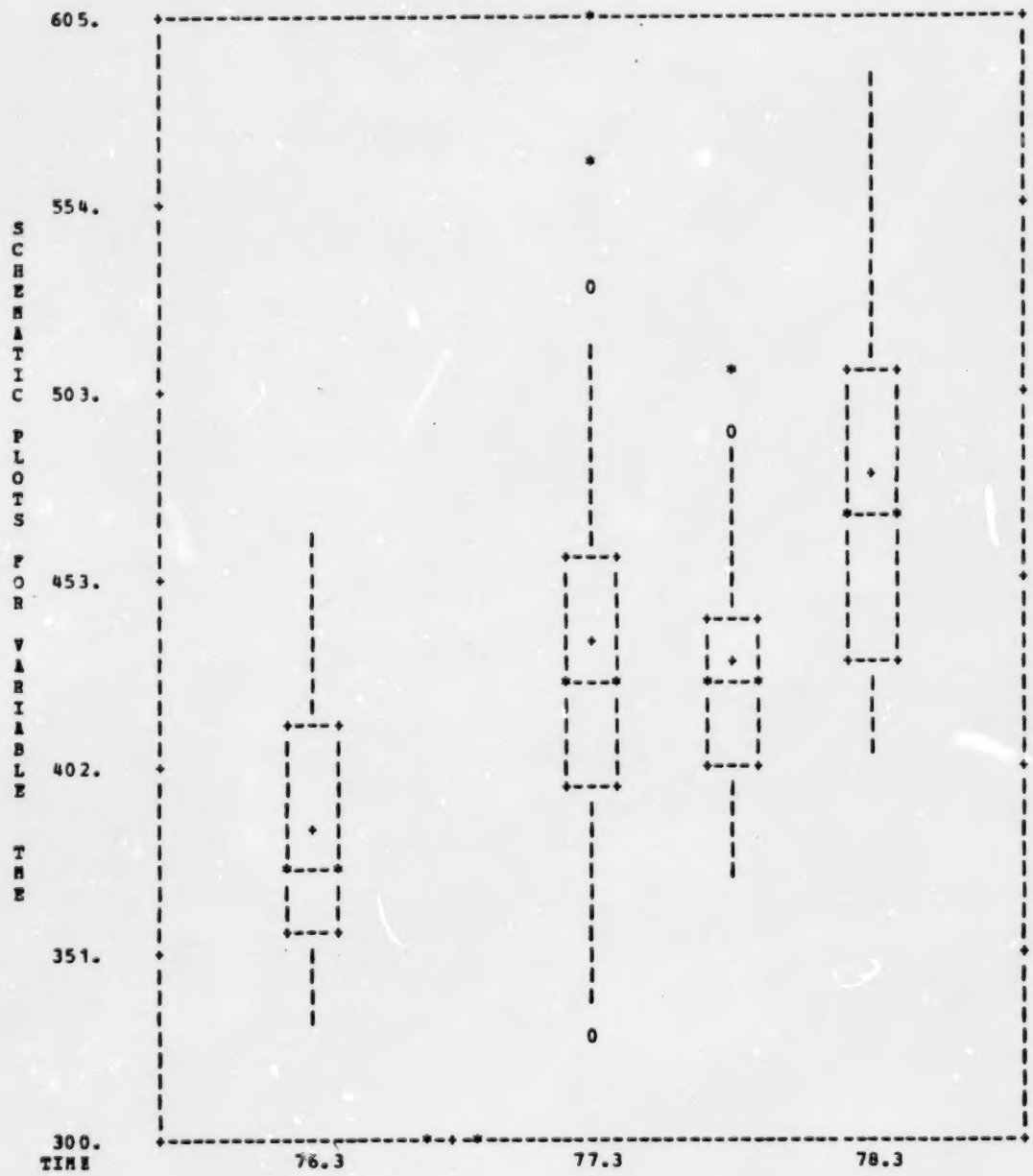
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TMZ) BY TIME 8
COHORT=3 NOSCH=382



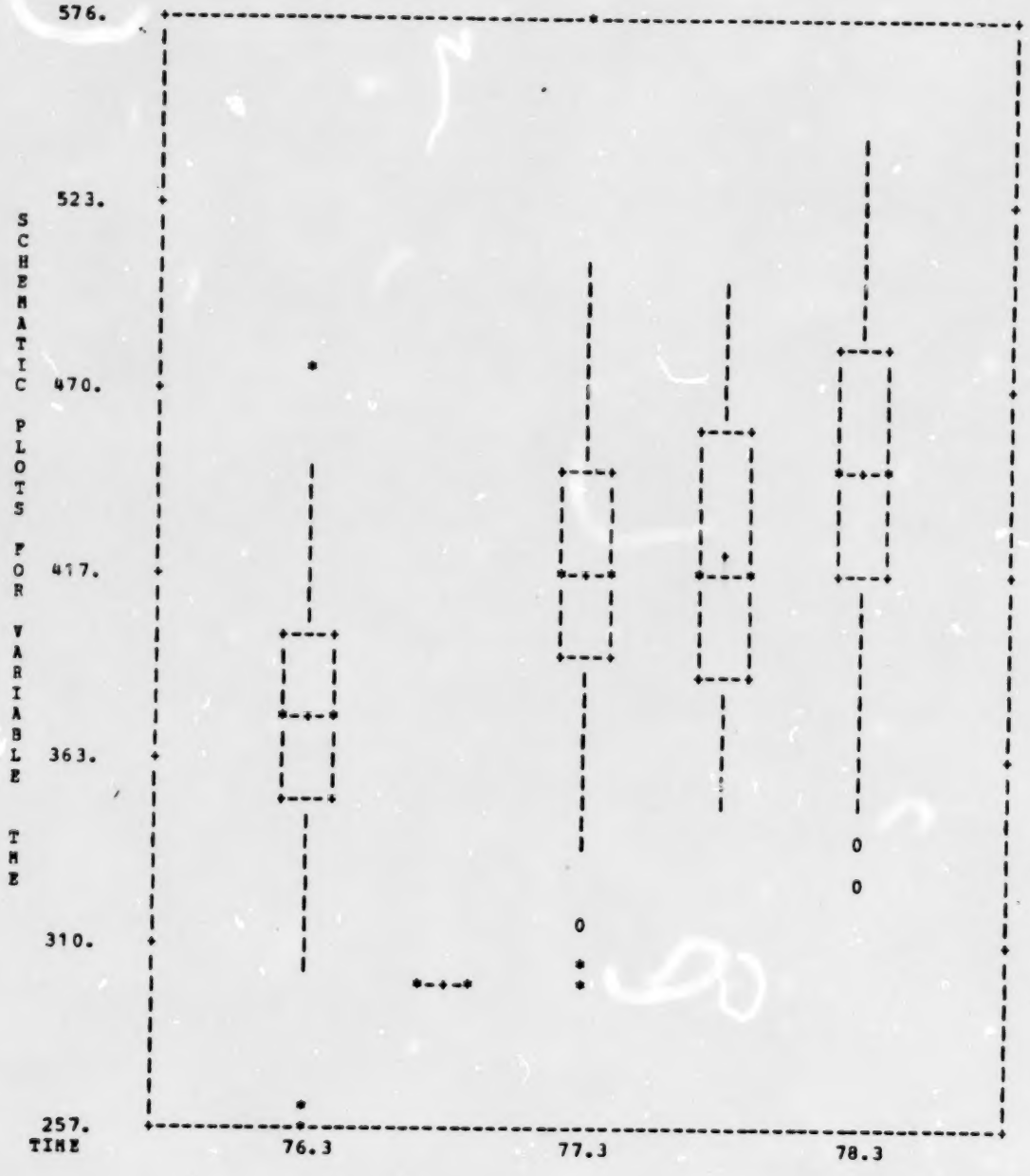
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 9
COHORT=3 NOSCH=395



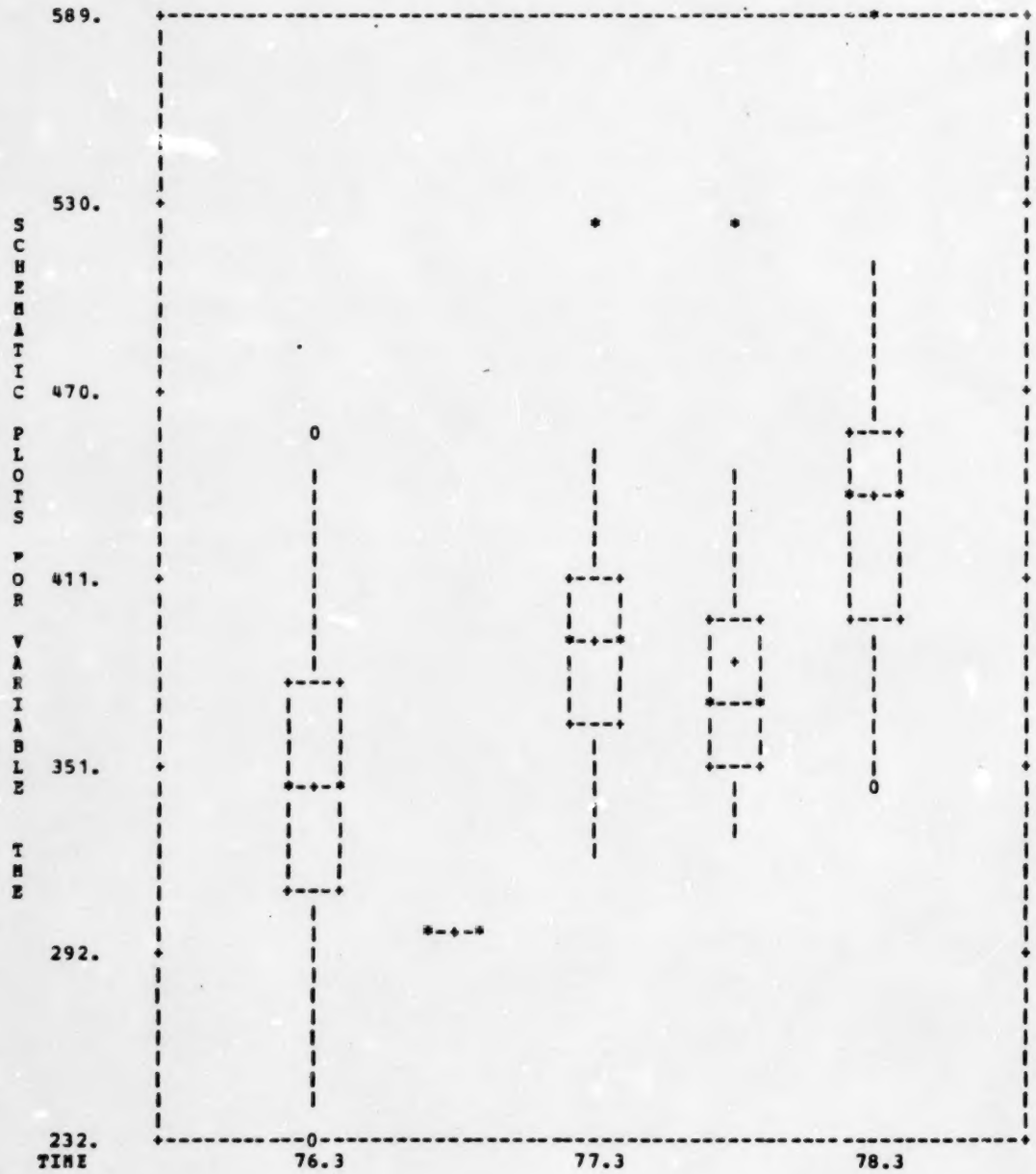
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 10
COHORT=4 NOSCH=302



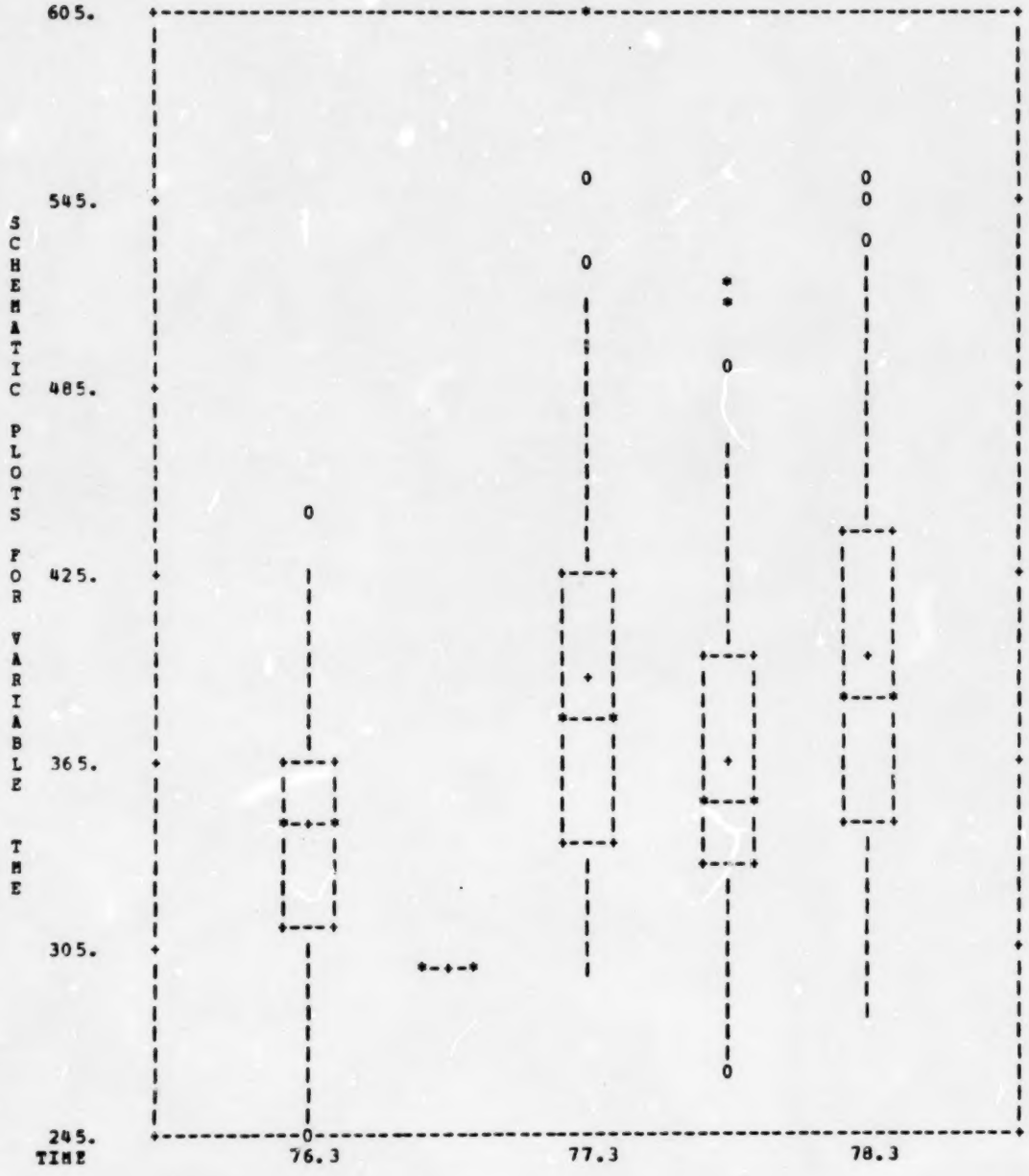
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 11
COHORT=4 NOSCH=309



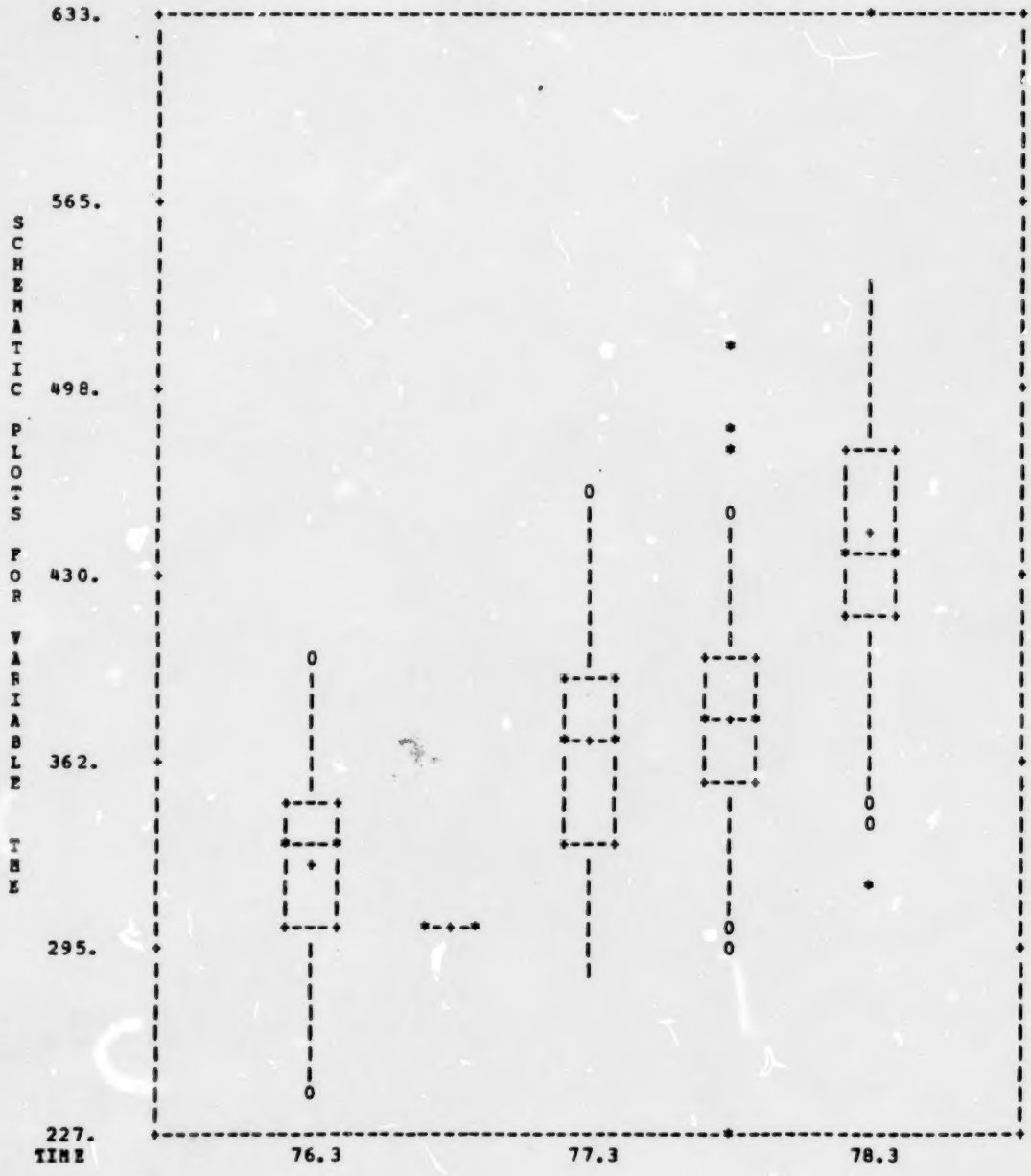
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 12
COHORT=4 NOSCH=320



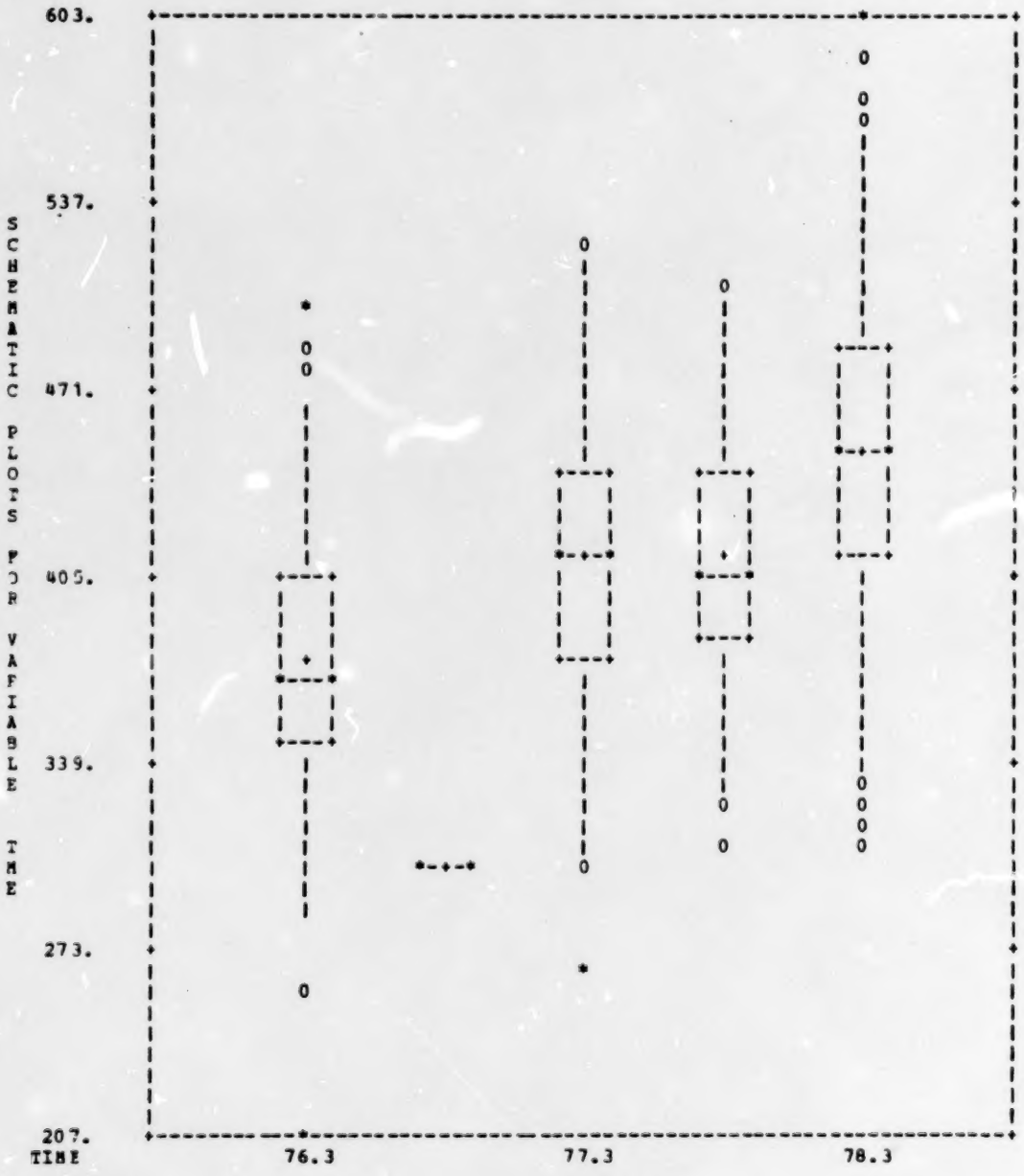
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 13
COHORT=4 NOSCH=322



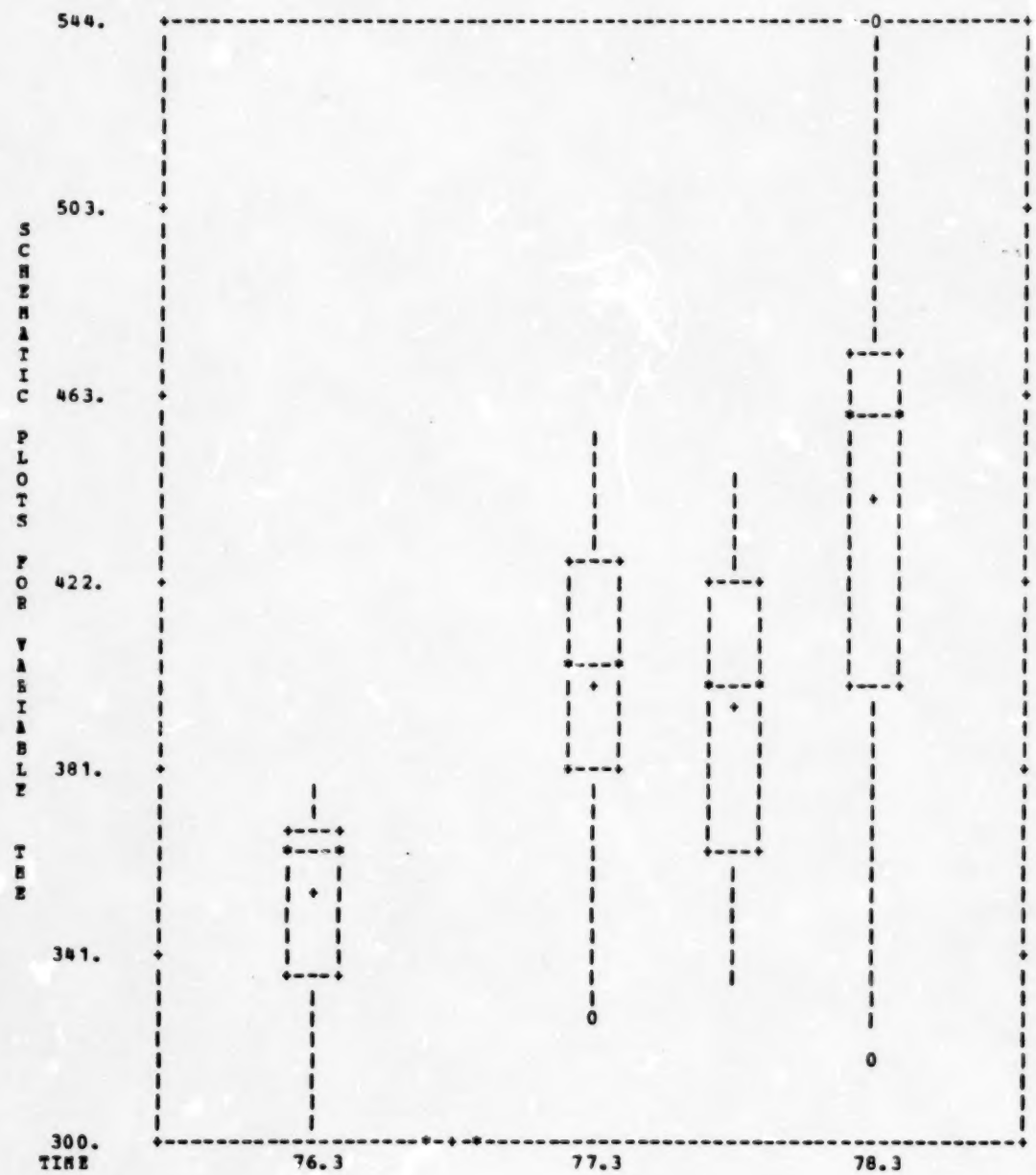
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 14
COHORT=4 NOSCH=334



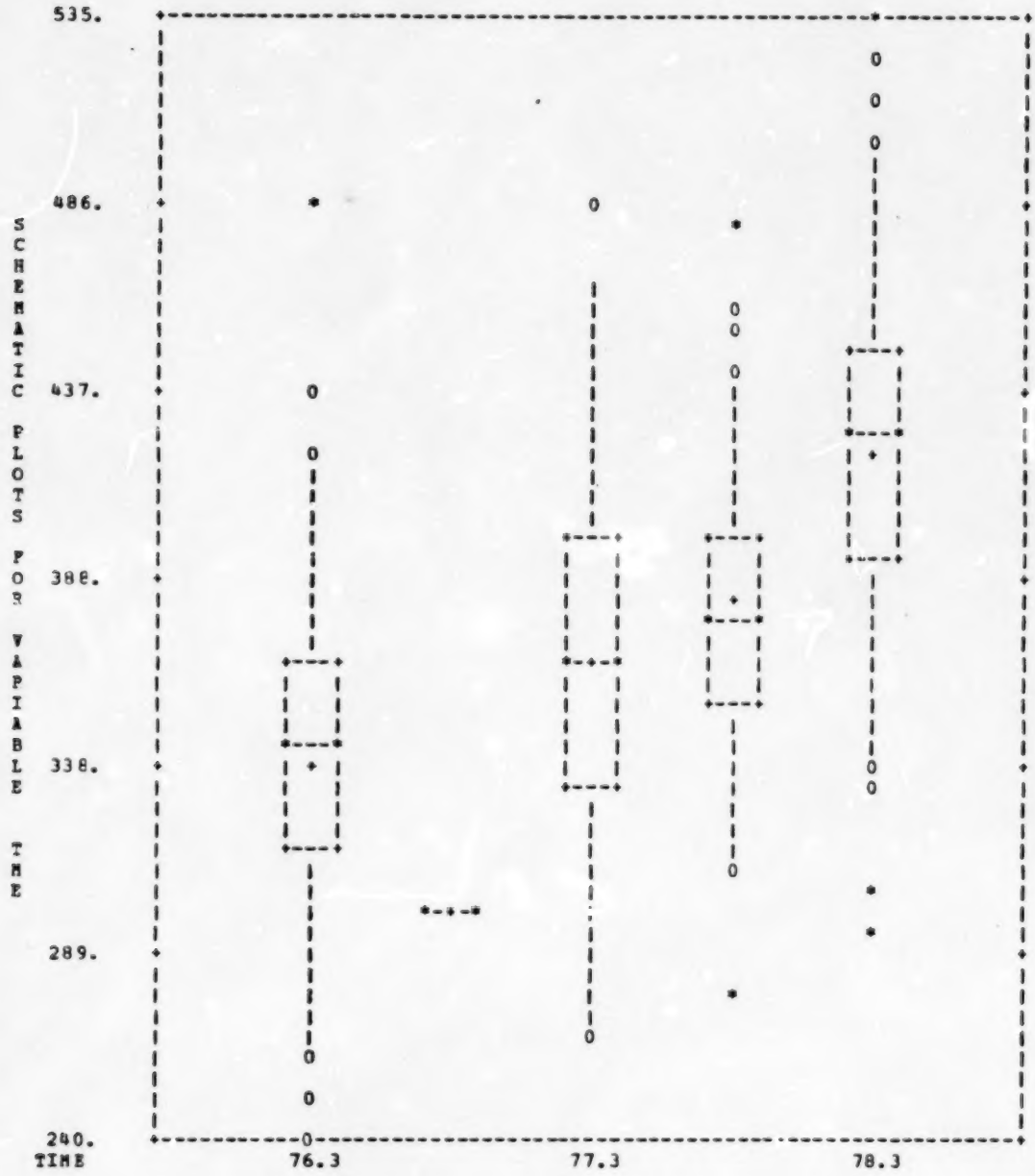
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 15
COHORT=4 NOSCH=344



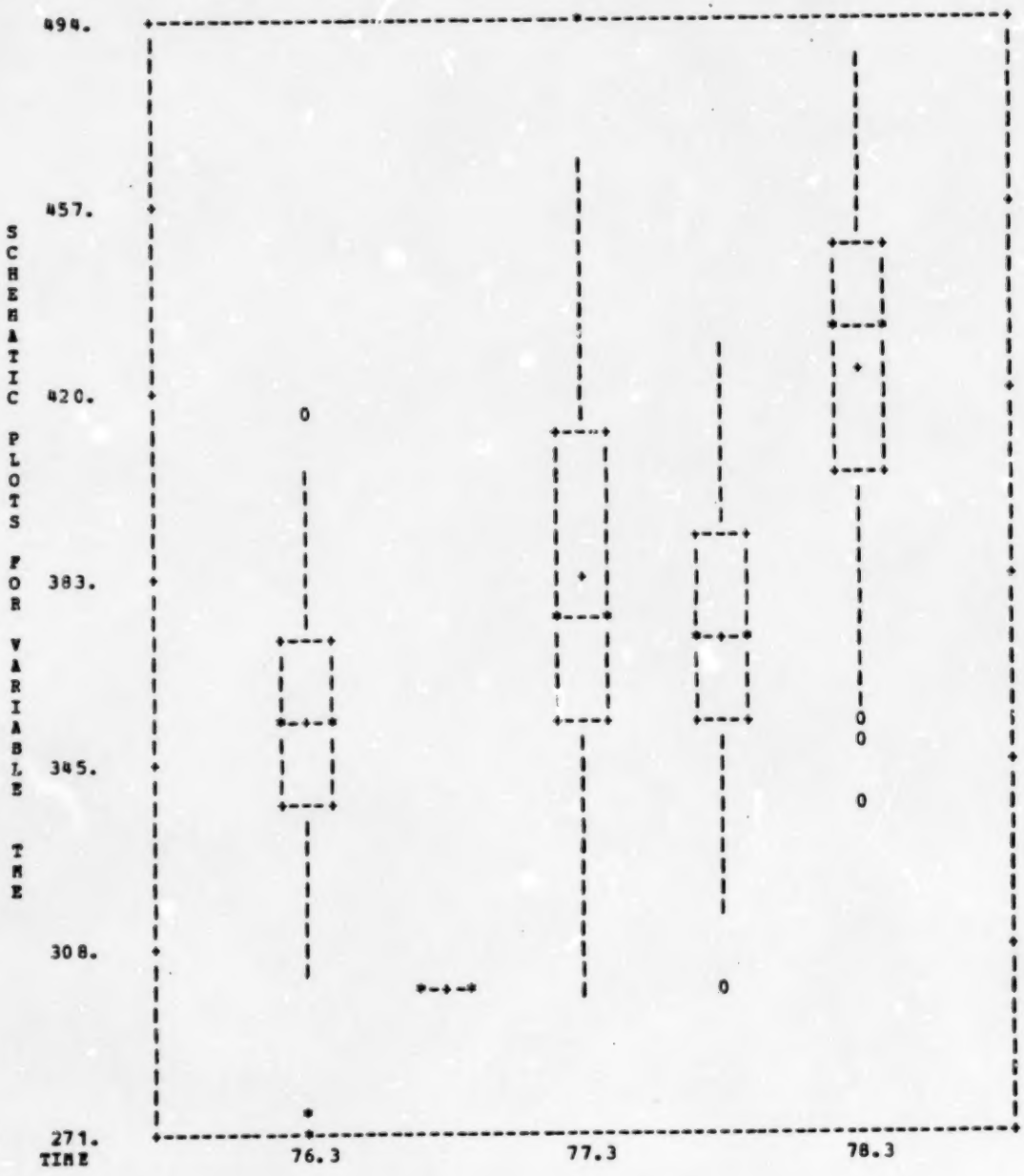
SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 16
\COHORT=4 NOSCH=368



SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 17
COHORT=4 NOSCH=379



SCHEMATIC PLOT OF TOTAL MATH EXPANDED STANDARD SCORES (TME) BY TIME 18
COHORT=4 NOSCH=382



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